THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 32 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME LXXII. No. 22. Whole No. 1,303. | NEW YORK, MONDAY, MAY 28, 1900. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

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[Special Editorial Correspondence.]

THAT BEEFSTEAK DINNER.

This is a consistently undignified tale of the Western Gas Association in its moments of relaxation; moments when, unbending from its customary high position of dignity and serious purpose, it frankly seeks and enjoys pleasure pure and simple—the tale in brief of a beefsteak dinner.

When the Western Gas Association in annual convention gathers, it rather expects that well trained and experienced committees on entertainment will provide something much to the liking of its membership. And this expectation is based on full warrant, for in the past has not the Association climbed to mountain tops, dived into caves, traversed wide lakes and rivers, swarmed on trolley rides and unbent in many ways all to its great pleasure and benefit, and with due thanks to the local committee? But when it this year reached Chicago, and found a "beefsteak dinner" only scheduled, it was consumed with wonderment as to the nature thereof; whether dress suits were proper or not, and, what the deuce was the committee about to give it anyway!

In fact so concerned with curiosity was the membership that every tongue was still when benign brother Neal (as the records, if veracious, of the proceedings will show), with steadfast purpose arose and announced that *he* for one desired to know *what* a beefsteak dinner was for which the price of a ticket was asked, stating that he had been advised that it was a repast where the guests grabbed chunks of meat from the passing waiters, to the great detriment of shirt bosoms and digestion; and that if such was the nature of the entertainment he questioned whether either his social position in the East or his Yankee desire to get his money's worth would permit him to participate. Firm, incisive and neat was the reply of President McDonald: "If Mr. Neal or any other member is not satisfied with what will be provided he can get his money back in the morning!"

The invitation itself threw no light upon the matter. A large and portentious sheet, measuring 10½ by 16½ inches, failed yet to measure the extent or to reveal the character of the mystery. A red-shirted man with a barrel of coke on his back, sounding for leaks, while wading out to an ocean steamer, and delibrately leaving wine and cigars within a few inches of him, seemed supremely idiotic and consistent with the suggestion of a "steer," in the southeast corner. And so 230 members concluded to take it on faith—or out of the Committee if need be—and to go anyway. Upon gathering at the club house of the Chicago Athletic Association, that magnificent building, so freely placed at the disposal of the Association, reassurance was not forthcoming, for with lock-step, strongly suggestive of Sing Sing experience, a solid phalanx of a dozen apparently muscular butchers bore down upon the gathering, duly clad in the aprons and caps of the trade. Apprehension was somewhat allayed when it was found that these gentlemen were not direct from the stockyards, but were merely a highly necessary, hilarious and high spirited section of the membership, who, believing that it is a Christian duty to give pleasure and amusement to others, had costumed themselves suitably to the occasion and against any emergency of gore or gravy! And when rotund Persons, bedecked with flowers, and looking like King Gambrinus, and elongated Guldlin, and Texas Miller, and effervescent Dickey, and Oh-be joyful Lynn, and all the rest of them, in turn uplifted and paraded around the officers of the Association and any other old thing that happened to be handy, it was a sight for the gods, and the entering wedge of the jollity of the night.

The doors flew open, the band played and the "beefsteak dinner" was on. And the members of the Association quickly found that the much heralded mystery was but an old friend in new and most attractive form. Instead of the usual stilted, formal and long drawn out banquet, was a meal most sensible and enjoyable throughout. Commencing, small globules of cast iron (caviar) were awaiting and eaten with great avidity, in order that some large and husky "old-fashioned" glasses of "bar"-test liquor standing by might be drained the quicker. That "bar"-test substance should have been preserved as a valuable adjunct to the gas business, for there is no question at all but that any observer essaying a bar-test after quaffing a glass could readily see and obtain any candle power desired, or several put together! "Open valves" (clams) followed, and in quick succession "on trays," (fish) with "purifiers" (tomatoes) and "spuds" a la gashouse, all leading to the piece de resistance of the evening—steak a la Chicago Athletic Association, grille d'eau. Steak such as Chicago only can produce. Steak that one would sink one's teeth in and then, in perfect content, lean back indifferent to the height of the gasholder, the mandate of the president, or the world at large. Ah! That was steak that *was* steak, and a most toothsome and welcome change from the endless courses of prepared residuals of the average banquet. It needed not the "pommes a la retort," or "a la superheater," or the ashy Welsbach "weeds," or the "naphthaline," or "drips" coffee that followed. It needed but the "liquor a la gasholder" and "ammoniacal liquor," duly served, to almost fully exhaust the vitality of the guests and stop their standpipes with satisfaction supreme.

It might naturally be thought that at this point the Committee had no doubt ended its labors. It had but begun. The surprise of the evening, and a rattling, rollicking, royal repast for the eye and ear at that point commenced.

President McDonald arising announced that the customary set and unset speeches would *not* follow (another stroke scored by the Committee), but that after due expression by the Association of its appreciation of the honor done it by the Chicago Athletic Association (neatly responded to by Vice-President Howells, of the Club), a vaudeville entertainment would follow, each act of which could be considered by the membership as a metaphor of some feature of the gas business.

The band played some more, the curtain rolled up, and on the screen, on the temporary stage constructed, was first the American flag, "Old

Glory," in all its beauty and inspiration, that suitably reminded the Association of steadfast purposes and of high aims and ambitions and that started the singing of "The Star Spangled Banner," in a patriotic outburst that was beyond the usual.

The lantern flashed, and on the screen appeared amidst loud applause the Western Gas Association, as photographed in Detroit when last it met there; that Association that (paraphrasing the well-known saying) "smells of tar, is full of peace, and first in the hearts of every Western man."

In quick succession then came pictures of many members. And in order that each might be duly recognized the Committee gently stood the retiring Shelton upon the stage and made him articulate "kind and appropriate" remarks concerning each. President McDonald, without a false note in him, and with a heart no meter can measure; "Uncle Jerry" Howard, as he ran with the fire laddies 40 years ago, and 188 years in the gas business; Ramsdell, the sweet singer of St. Davids, uncaptured yet by the Salvation Army; "Wandering" Littleton, said to be organizing a competing association among the organ-grinders of Italy; Somerville and Young, the stalwart and kindly chiefs of the "hoot mon" class; Chollar, the man of inverse squares and reverse valves; Faben, never known to miss (a) meeting (the ladies)—"Petticoats before papers" his motto; White, the prattling, post-prandial, imperishable, inexperienced, unapproachable, indispensable "Harry;" Cowdery, who helps make Milwaukee famous; Slater and Leach, the twinlets; Russell, with his ever ready mouthpiece and courteous retorts; Roper, with the glad hand of honest fellowship; Hayward, the well balanced governor; Copley, the politician-Colonel; and Dunbar, the perennial blossoming Secretary plant, from its native wilds on the Ohio river.

These pictures were a great and distinctive hit. As the well-known faces appeared upon the screen round after round of whole souled, hearty applause was given, that must truly have warmed the cockles of the hearts of those portrayed, as well as of the Chairman of the Committee, whose clever thought adduced them.

Again the band played, and with a blare of trumpets appeared Altamont and Dumont, who did various things on various instruments, and were said by "Mac" to be emblematical of what can be done in cooking by gas. I take his word for it, with the hope that lady cooking lecturers in Albany do not wear hussar costumes! Sabel followed, and she, by earnest and direct address to several in the audience, gave a correct imitation of how to solicit new business. Martinetti and Sutherland, it was at first thought, would advertise a certain gas making process, but as their work centered largely around retorts, the superheated chaps in the audience took no issue with them; Grant and Norton portrayed the old time attitude of old line companies vs. the public, by informing "Uncle Jerry" that he was a lobster, whereupon he presented each with flowers with Chesterfieldian grace, and to the great glee of the audience. The Nielson sisters then sang in great harmony, accurately portraying the team work of Slater and Leach, while Adelman carried the house by storm by his rendition of "Dixie" and other patriotic airs in an exemplification of knowing one's business.

An uncouth individual then gave an exhibition of jugglery, which was, however, inferior to many exhibitions of such in our business direct; while McIntyre and Heath, wending their way home with busted hopes and no assets but an empty trunk, dolorously reminded the crowd of some gas enterprises that had also marched up the hill and down again. The close was by a young woman yclept Karina who, on the lines of the Drury Lane christmas pantomime, wound up with a grand allegorical representation of the gradual reduction in the price of gas in the United States. At least that's what is supposed, for nobody understood the State street French in which she sang. But as she sang she gradually cast off her raiment, emblematic of clipping the price, until she got down to the present Peoria basis of about 30 cent gas. It is truly fortunate that gas in this country has never gotten down to the point of nothing, and that at a dime per garment she was left with at anyrate three unshed.

The trumpets blared, the curtain fell, and the beefsteak dinner was over, with three cheers and a tiger for the President, the Committee, the Athletic Club and all concerned. Never has the Western had such a royally good time as on May 17, 1900, in Chicago. By unanimous consent the entertainment was voted to be in a class by itself, head and shoulders above all that had preceded it in the Western Association.

The Committee did itself proud; every member upon it can felicitate himself upon the outcome of the Committee's work, upon the real enjoyment, the novel entertainment and the unusual success attained. To single out one member beyond another is a delicate matter; yet to fail to particularize the unremitting work of Mr. Williamson and of Mr. Harper would be to overlook those to whom the most credit is due. And in this connection let not the members forget that the ticket fee undoubtedly fell short of the cost, and that without ostentation or advertisement the local Gas Company and supply houses gave materially, as well as of their time, to the entertainment of the Association. When an ordinary orchestra is not good enough, but a portion of Thomas' orchestra was engaged, the keynote of the Committee's thought is given.

And did brother Neal ask his money back? Not much. He was glued to the very front seat until the last curtain fell. And Uncle Jerry! Did the strain tell on his 70 years? Not much. In passing out he said, "Would that I could repeat every moment of it, and at once!" And McDonald: Sincere, loyal-to-the-Western, loved by all, McDonald! Was he happy? As he realized the success throughout of the meeting in which he, an Easterner and a supply man at that, was so honestly respected and honored, his, frank, honest happiness fairly stuck out, that the meeting of his year was such a success.

High is the mark set by the record of the year 1900. It will be long ere 'tis surpassed.—S.

[Official Report.—Revised by the Secretary.]

PROCEEDINGS, TWENTY-THIRD ANNUAL MEETING, WESTERN GAS ASSOCIATION.

Held in the Auditorium Hotel, Chicago, May 16, 17 and 18, 1900.

First Day, Wednesday, May 16.—Morning Session.

The Association was called to order, at 9:30 A.M., May 16th, by the President, Mr. William McDonald, of Albany, N. Y. The Secretary, Mr. James W. Dunbar, of New Albany, Ind., occupied the recorder's desk.

Chicago Extends a Welcome to the Association.

The President introduced to the Association Dr. Howard S. Taylor, Prosecuting Attorney for Chicago, who, representing Mayor Harrison, (the latter's official engagements prevented him from welcoming the Association in person) spoke as follows:

Mr. Chairman and Gentlemen of the Western Gas Association: His Honor, Mayor Harrison, whose pleasure it would have been to have formally welcomed you to the city of Chicago, found that at this hour he would be imperatively engaged in official duties, and he asked me, as one of his Cabinet, to be present in his place, and in his name and in the name of the city of Chicago to tender to you the congratulations and the hearty welcome which your personal characters and your calling entitle you to receive. I am sure that Chicago ought to be very willing indeed to welcome you to the city. You are the "Children of light," and are entitled to every compliment which your calling would suggest. And we can all the more readily tender these felicitations and welcome because the heavy winter months are past, and the time of the singing of the birds is here, and as our heaviest bills have been liquidated and nearly forgotten, we are in the pleasurable contemplation of a small meter register for the next few months, so Chicago can afford to bid you welcome. Any calling which has to deal with the advance of physical or material civilization is not only fit and proper to be complimented in this age of material civilization, but particularly so in Chicago. From its foundation, in the little old fort in the mudbank down at the mouth of Skunk River, as it was then called, up to the present time, Chicago has literally been created by science. A sort of human fiat has passed out and made complete the Divine fiat, "Let the dry land appear." We have had to make our harbors in a place not well adapted to harbors. We have had to absolutely build the foundations of a great city in a substructure of mud. We have had to find drainage in the most costly and the most ingenious of all possible processes. From the beginning to the end, whatever Chicago is, commercially, socially and intellectually, we have to go back to the physical scientists, to the inventors, to the contractors and to the enterprising men who have found ways and means to make a great city where Providence apparently did not intend to have any. To day here we are, the most rapidly growing city in the world, just past the two million mark in population, and our trot rapidly merging into a gallop. Not only in point of population, but in every other respect that you could well name. Young as we are, crowded as we are, and sometimes called the "Packing Town," nevertheless it is a fact absolutely that the history of the world has no parallel to our advance in other directions. Great universities have sprung up as if under the magician's wand. Great libraries, which are observed among the literati of Europe, have sprung up. We have our own literary circles. We have everything. We have the greatest industries, and we have the greatest agitations of industry. We have more labor, and we have more labor difficulties than any other city in the world. To this great Cosmopolis, with its varied population, to its industries, to its wide area, and to the widest range of gas light in the world, we cordially invite you and bid you welcome. Your associates who reside here will tell you where to go, and your native prudence will tell you where not to go. We have a confident expectation that you will have a good and profitable time. And, now, Mr. Chairman and gentlemen, being perfectly aware of the fact that your fellowship together, and that the business problems you have before you will be far more interesting and entertaining than any desultory remarks of mine, let me close by saying, in Mayor Harrison's name, and in the name of the city of which he is the chief magistrate, we bid you a most hearty welcome and tender you the freedom of the city. (Applause.)

At the invitation of the President, Captain William Henry White responded to the words of welcome spoken by Dr. Taylor. The Captain's speech was in his best vein, and a round of applause marked its termination.

On motion of Mr. F. Egner, the reading of the minutes of the last

annual meeting was dispensed with. Vice-President Thos. D. Miller assumed the chair, and the President read the following

INAUGURAL ADDRESS.

Gentlemen: The rolling years have brought us to the Twenty-Third Annual Meeting of the Western Gas Assoctation. We have also come to hold our meeting in the great metropolis of the West. Chicago I think can more truly be said to be the home of the Western Gas Asso ciation than any other city. It is the natural center of the business of the great West, and in my opinion the meetings of this Association should be held here at least every third year. It seems to me that the objects of a gas association are threefold: First, the increase of the knowledge of its individual members; second, the use of that knowledge for the improvement and increase of the gas business; and, third, for the added light, knowledge and happiness it can bestow on the world at large. If this is true, and I hold it to be so, where better can we strive to carry out the purposes of our being than in the great centers of activity and usefulness?

It has been said that the Western Gas Association is only Western in name; that its sphere of usefulness is boundless as the continent. While that is undoubtedly true, I believe this Association should have a place it calls home, and that this home should be within the geographical limits of what is known as the West.

I cannot proceed further with this address until I have expressed my appreciation of the honor you have conferred upon me by electing me your President. I love the Western Gas Association. Many of the warmest friendships of my life are among its members, and while there seems to be little that I can do to advance its interests I am ready to pledge to it my most earnest endeavor for its profit and pleasure at this meeting and the advancement of its future success. From its beginning, twenty-three years ago, this Association has been officered by men of heart—not that they have not had brains as well; but in most cases they have been honored with office because they were loved. There has never come into this Association since its organization what could be called a schism. Differences of opinion, and strong ones, have occasionally developed, but they have never caused bitterness. And why? Because the hearts of the members have been knit together in friendship and love, as well as the determination to progress. "Our young Lochinvar has come out of the West." I do not say that everything that comes out of the West is the strongest, bravest and best, but I do say that it is the history of the world that the men of the West have proved themselves brave in their undertakings and strong in carrying them out. Where you mix the rugged characters of the West with the posssibly broader and more technical characters of the East, as found in this Association, you have the best. The history of this Association has proved this to be true, and its work during its twenty-three years of life has been a great factor in the advance of the gas industry.

It is a part of our humanity that rarely can an organization of this kind meet that we do not have to pause and think for a time of those who have been in the habit of meeting with us and who have answered their last roll call. Death has this year claimed two of our members: Jerome Croul, who died September 26, 1899, and James Gardner, Jr., who died January 16, 1900; the first after a comparatively full and busy life, and the second in his early manhood. Both were known to nearly all our members. We shall miss them and sincerely mourn their loss. I presume a memorial committee will take suitable notice of their death.

Since our last meeting we have all received a copy of the published Proceedings of the Association for the years 1896, 1897 and 1898, and I am sure that, as you have looked them over, you have felt glad you were a member and proud of its work. We are under great obligations to Mr. O. O. Thwing, of St. Louis, for auditing the volume in so practical and complete a manner, and for his oversight of the printer who caused the production of so handsome a volume. In accordance with the instructions of the Association he is now preparing to publish the Proceedings for 1892, 1893, 1894 and 1895. With Mr. Thwing this is purely a labor of love, and he is entitled to the hearty thanks of the Association and a word of appreciation from its members.

You are all doubtless aware that an International Gas Industry Congress is to be held in Paris, commencing September 2, 1900. Circulars have been sent to the members, giving the programme and list of subjects to be discussed. At the meeting of the Executive Committee last December, your President was appointed to correspond with President Vautier regarding the preparation of papers by members of this Association. There has seemed to be a great deal of hesitation about undertaking work of this character, and I have only succeeded in getting the promise of one paper to be prepared for the Congress. This is by Mr. Frederick H. Shelton, and is entitled, "The Reduction of Cost of Distribution by Use of High Pressures." It is not necessary for me here to take up your time with the details of the programme, etc., as you will find the matter fully set forth by the Secretary of the American Gas Light Association, in THE AMERICAN GAS LIGHT JOURNAL, of May 7, 1900. I recommend that the Association consider the sending of accredited delegates to Paris to represent them at the Congress. I would especially call the attention of the members to the steps necessary to secure a copy of the Proceedings, and I have no doubt Secretary Dunbar will be glad to receive the $3.95 and forward it for you.

Thanks to the efficient work of the Secretary and the co operation of the members, the plans for this meeting seem to be well in hand, and the papers to be presented are all of an interesting and profitable character.

We all remember the work of the Membership Committee of last year, and the large accession to our membership that was secured through their labors. It did not seem feasible this year to secure a committee of the same character, so a different course was pursued. The Secretary has sent out circular letters to the gas companies urging them to be represented in the Association, and I have reason to believe that we shall at this meeting receive an addition to our membership that will compare favorably with former years. Membership in this Association is worth far more than the time and money it costs; and I believe it is the duty of every gas company in the West to be represented at the Association meetings, both for the good it does the representatives and the profit it finally brings to the company represented.

It is a wise provision of the bye-laws that an address shall be presented to the Association by the President at the opening session. This has been brought home to me by the amount of thought I have been compelled to give this address. From the first I knew it would be useless to attempt to advise the members of this Association on the technical side of their business, as most of them are more familiar with that part of it than I am, and so I am going to give you a few thoughts from a business standpoint, and recommend two subjects for your very careful consideration. I should have said three subjects, if it were not for the fact that you are going to have a paper on the subject of "Public Control of Rates;" and I am sure this paper will call out a discussion that will fully cover the subject. The subjects to which I shall call your attention are not new, but are of ever increasing importance. The first is the relation of capitalization to output; or, if you please, possible output. In the past no other class of investments stood higher in the minds of investors than gas securities, and we know that they were deservedly so. In the past few years there has swept over the country an almost insane desire to secure gas plants and finance them. It has generally been a profitable business for the financiers. Do not mistake me. I believe in some cases it has been a good thing for all interested. Many companies which had not reached out in accordance with their opportunities have been vastly improved by new and more systematic management. The gas business of the country has been largely increased by combinations of capital and good business methods; but has not the time come for us to stop and consider? No gas company should have more than a reasonable amount of water in its composition, but when one syndicate after another tries its hand at the watering process, will not the mixture get thin? Has it not already shown itself so in some instances? The Secretary and myself both tried to secure a paper for this meeting on the subject of "Gas Companies' Accounts," and failed. Why? In my opinion, because the men who were capable of preparing such a paper did not want to undertake the work. Mr. Humphreys, in his address to the American Association, went largely into this subject. What we want is a system of accounts that will show what it really does cost to manufacture and deliver gas over a series of years, so that we may know what relation output does bear to capitalization, while the numbers of gas consumers are rapidly increasing.

Second. I want to call your attention to the constant decrease of the use of gas for illumination by large consumers. In an address by its President to the stockholders of the Consolidated Gas Company, of New York, he said: "The annual consumption of gas per meter for light is gradually and surely diminishing." President Addicks, in his address to the New England Association, said: "If you turn to the Gas Commissioners' reports of past years you will notice that the sale of gas through meters is less per meter than it formerly was." The evidence is accumulating that this is true in constantly increasing proportions. Does not this fact have some bearing on the amount of capital to out-

put? Will not the proportional wear and tear increase, and will not these constantly increasing conditions change the cost of distribution? These are matters, in my opinion, for your profoundest consideration.

For the past year there has been waged in the city of New York the most gigantic gas war that this country, and I believe the world, has ever seen. It is unquestionably waged because of differences of opinion as to how much capital a given output of gas will stand. How long or how far this war is to be continued no one seems able to determine, but out of this war, in my opinion, will come, to a greater or less extent, a settlement of the question of the amount of capital that can be carried on a given gas business in a given territory. More or less public control of gas prices must be considered, and the thought in my mind is that, with the constantly increasing capital, the constantly decreasing amount of gas per meter and the determined efforts of the public to control the price of gas, it would seem well for us to consider carefully the amount of investments that can be placed in gas properties. I was very much attracted by the musing of President Addicks in his address[1] to the New England Association. Doubtless you have all read it, and wondered whether sometime in the future some such system as he describes will not come into use in the production of light and heat. I have not lost faith in the gas business. While we are losing some of that business to the electric light producer, we will yet go on increasing the amount of gas used as a whole. Gas for fuel purposes is only in its infancy, and what we have lost in light we will gain in its uses for fuel. There is no other occupation that can compare with that of producing light and heat. The sun is the center of the solar system, and all life depends upon it. You are engaged in giving to the world artificial sunlight and heat. By what special process or processes this shall be done in the future we cannot tell; but this I believe, that gas will be a large factor in its production. So the question comes to us as to what part we are going to take in the future. Shall we not as individuals strive to increase our knowledge so that we may give the benefits of that increasing knowledge for the improvement and increase of the gas business, and so add to the light, knowledge and happiness of the world at large!

"Lives of great men all remind us
We can make our lives sublime,
And, departing, leave behind us
Footprints on the sands of time."

On motion the address was referred to a committee, composed of Messrs. H. L. Doherty, G. G. Ramsdell and W. H. White, for consideration and report

Appointment of Special Committees.

The President named the following special committees:

On Place of Next Meeting.—Messrs. A. H. Barret, B. E. Chollar and J. B. Howard.

On Memorials.—Messrs. W. E. Helme, Jas. Somerville and H. D. Walbridge.

On Final Resolutions.—Messrs. J. Gimper, Paul Doty and J. W. Murdock.

Report of the Board of Directors.

The following report of the Board of Directors, which was read by the Secretary, was, on motion of Mr. Jenkins, accepted and ordered spread upon the minutes.

To the Members of the Western Gas Association:

The annual meeting of the Board of Directors of the Western Gas Association was held at 10 A.M., Tuesday, May 15th, 1900, and was called to order by the President, Mr. Wm. McDonald, of Albany, N. Y. The following members of the Board were present: Wm. Mc Donald, Albany, N. Y.; Thos. D. Miller, Dallas, Texas; A. H. Barret, Louisville, Ky.; Z. T. F. Runner, Freeport, Ills.; Jno Gimper, Galveston, Texas; B. W. Perkins, South Bend, Ind.; Geo. McLean, Dubuque, Iowa; J. W. Dunbar, New Albany, Ind.

On motion of Mr. Perkins, the following papers were accepted for presentation to the Association:

"The Hygienic Effect of the Use of Gas," by Mr. Thos. D. Miller, Dallas, Texas.

"Candle Power: Its Present Relation to the Gas Industry," by Mr. Jno. R. Lynn, Portsmouth, Ohio.

"Public Control of Rates," by Mr. Geo. McLean, Dubuque, Iowa.

"Monthly Technical Report of Operation in Coal Gas Works," by Mr. W. E. Steinwedell, Belleville, Ills.

"Telescoping a Gasholder," by Mr. Jas. Somerville, Indianapolis, Ind.

"A Central Station Electric Plant Operated by a Gas Engine," by Mr. J. C. Small, Aurora, Ind.

"Temperatures in Condensation," by Mr. W. H. Barthold, Grand Rapids, Mich.

"The Systematic Location of Gas Mains and Other Pipes in the Streets as Opposed to the Popular Idea of a Subway," by Mr. D. McDonald, Louisville, Ky.

"Regenerative Benches," by Mr. H. C. Slater, Milwaukee, Wis.

"Wrinkle Department," Edited by Mr. F. H. Shelton, Phila.

The President appointed the following Committees:

On Applications for Membership.—Thos. D. Miller, A. H. Barret and B. W. Perkins.

On Auditing.—Jas. T. Lynn, Jno. Gimper, Geo. McLean.

On Introduction of Visitors.—Jas. T. Lynn, F. Egner, Jno. Gimper.

The Secretary and Treasurer submitted his annual reports.

There being no other business, the Board adjourned.

Jas. W. Dunbar, Secy.

Reports of Treasurer and Secretary.

As Treasurer, Mr. Dunbar reported receipts for the year, to May 1, 1900, of $1,843, expenditures of $2,149, and a cash balance of $914.

As Secretary, he reported the membership, on date of May 1, 1900, as shown by the corrected rolls, at 323. Badges to the number of 15 were on hand.

Reading the Papers.

The President introduced Mr. Howard C. Slater, of Milwaukee, Wis., who read the following paper on

REGENERATIVE BENCHES.

By the term "Regenerative Benches" I understand is meant those benches in which the air necessary for combustion, secondary or primary or both, is, before arriving at the place of combustion, heated in recuperators or regenerators by heat absorbed from the products of combustion, after they pass the last retort in their course and before entering the main flue or chimney. The advantage of preheating the secondary air is, I believe, acknowledged by all who are familiar with gaseous firing, whether this preheating be done by absorption of heat from the products of combustion or otherwise. The efficiency in the use of the heat given out by the combustion and transmitted through the walls of the retort is, other things being equal, greatest with the greatest difference of temperature between the inside and outside of the retort. Hence, that which increases the temperature of combustion, as the preheating of the air supply, tends to increase the efficiency of the apparatus. This preheating can be accomplished by absorbing heat from the products of combustion after they have given up as much as may be to the retort, where the heat is wanted, and still leave enough heat in these gases, as they pass into the chimney, to produce the necessary draft for the operation of the bench. The temperature of the outside of the retort being about 2,000° F., and a temperature of from 500° to 600° F. sufficient for draft, it is easily seen that a saving in the fuel account may be realized, if we can return into the setting this amount of heat, which would be given up by the products of combustion on cooling from the higher to the lower temperature. Whether this saving in fuel is counterbalanced by the extra cost for recuperators must be decided by local conditions.

From a paper by Mr. G. Helps, published in the *Journal of Gas Lighting*, Volume 74, page 1055, and one by Mr. C. C. Carpenter in the same *Journal*, Volume 70, page 1054, it seems that little or no benefit was derived from regeneration, equal or better results being attained, both financially and as to fuel account, by preheating the secondary air without the use of the heat from the "waste gases." These results as to cost, I believe, were on account of the cheaper construction of the part of the bench for preheating the air, as compared with recuperators, and possibly also to heating the secondary air to a greater degree than was accomplished by recuperators, and to the even distribution of the heat throughout the setting. I do not understand the failure of regenerative benches to show an advantage in the fuel account, unless it may be due to the last mentioned causes of greater degree of preheating secondary air and better distribution of the heat in the benches without the regenerators.

The preheating of the primary air is, I think, somewhat open to question, inasmuch as steam is used under the grate in order to keep the temperature in the fuel bed, at least in the lower part of it, where the proportion of ash is considerable, below that at which the ash would agglomerate into a hard clinker.

The amount of steam used should be as low as consistent with the desired effect on the ash, as the steam tends to lower the temperature of

1. See Journal, March 5, 1900, p. 362.

combustion, not only in the furnace but the secondary combustion as well. The combustion of the hydrogen formed from the steam probably tends to localizing intense combustion close to the nostrils, giving a less even distribution of heat through the oven than the combustion of the furnace gases without hydrogen. The specific heat of steam being higher than that of the other products of combustion, steam would increase the waste heat in the gases passing up the chimney. Again, the steam being formed from water, there is the unrecuperated heat of evaporation. It may be argued that the water may be evaporated by the products of combustion on their way from the primary air recuperator to the chimney. Is it not better, however, to evaporate the water by heat from the grate, because in this way the amount of steam formed would seem to be more nearly the amount needed, more being formed just after clinkering or pricking up when the grate is hottest, and less as the grate and material on it become cooled. By evaporating the water with the heat of the waste gases a nearly constant amount is formed in a given time, and to effect the desired results on the ash this amount must be the maximum required; consequently, as the lower portion of the fuel bed becomes cooler and the accumulation of ash hinders the passage of the primary air and steam, the primary air will be decreased, but the amount of steam remaining the same would tend to lower the temperature in the furnace more than required.

About 30 pounds of water evaporated per 100 pounds of coke used in the furnace is usually sufficient to prevent the formation of troublesome clinker, but this would vary somewhat, depending upon the character and amount of ash in the fuel used.

Sometimes it seems that a bench does good work in fair weather, but not as well during a foggy or rainy spell. Is this not at least partly explained in the following? Suppose the air at a temperature of about 60° F., and half saturated with water vapor, and the total steam passing through the fuel bed to be 30 pounds per 100 pounds of coke burned. Again, suppose the day to be foggy or rainy, so that the air is saturated with water vapor. In the second case the introduction of vapor by the primary air will be increased by nearly 3½ pounds per 100 pounds of carbon burned in the furnace, or an increase of 11⅝ per cent. in the amount of steam passing through the fuel bed, and assuming the same increase of 3½ pounds carried in by the secondary air, we have nearly 21 per cent. increase in steam passing through the setting, the amount in the first case being 30 pounds through the fuel bed and 3½ pounds with the secondary air, making a total of 33½ pounds.

Discussion.

The President—Mr. Slater's interesting paper is before you, and I have no doubt it will bring out a very interesting discussion.

Mr. Odiorne—I would like to ask Mr. Slater whether he is using full-depth or half-depth furnaces of this character?

Mr. Slater—We are using full-depth and have recently had very fair results. We have been using, as near as I can get at it, in benches of nines, about 23 per cent. of the coke we make in the furnace as fuel. We use it in benches of nines.

Mr. Odiorne—My experience has been with the use of the half or semi regenerative benches. I have used as fuel slag or dump from the coal mines, which we can procure very cheap. I find it a great saving over the use of coke. We can do the firing with this slag at less than one-third the present price which we are obliged to pay for this. Formerly we got this slag simply for the hauling, but later we had to pay one cent per bushel for it, and recently we were told that the price was to be advanced to two cents per bushel. Even at that, however, its use will prove very much cheaper than firing with coke. I have a few figures regarding it which may possibly be of interest. The cost of firing with coke for 24 hours was $3.05: we used 2,457 pounds, or 61 bushels. Firing with slag we used 3,872 pounds, or 46 bushels, costing, at two cents per bushel, 92 cents, a saving of $2.13 per day. I made the test for 30 days, and figured it for that time. During this test very near the same amount of coal was carbonized in the retorts. It is not a large yield per bench, being about 42,676 feet, or about 7,102 feet to the retort. As these benches have been in use for about 2½ years they are not to be considered as new ones. They did better of course when they were new.

Mr. Doty—The subject of bench firing is attracting considerable attention among gas engineers to-day who are impressed with the necessity of increased economies. I believe that Mr. Henry Doherty is the father of the suggestions for using mechanical stokers for bench firing, and the reasons are excellent. The uniform firing load makes the use of mechanical stokers a distinct saving. I understand from Mr. Slater that the Milwaukee Company has in use mechanical stokers for bench firing, and one of the strokers, I understand, is applied to the regenerative benches. It would be interesting if Mr. Slater would give to the Association the benefit of some of his experience in connection with the application of mechanical stokers to regenerative benches. The character of the flame from the stoker must be different in the main from the long coke or coal flame. Then, the application of the heat is different. I, for one, would be very much interested indeed in knowing why, in Mr. Slater's opinion, the stoker is of practical advantage.

The President—I think it will be better for us to understand that the writer of the paper will not answer the questions until the discussion is through, so I will consider, if no objection is made, that such course will be pursued.

Mr. Egner—It seems to me Mr. Slater is using a great deal too much water under the benches, and that perhaps if he used considerably less he would get better results. In fact, it seems to me, he is using nearly twice as much as is necessary.

Mr. Forstall—Mr. Slater refers to the English idea that recuperation does not pay. The English have spent 15 or 20 years discussing the subject and have not yet arrived at a conclusion. Some say that recuperation does not pay, and others say that it does pay. When the paper of Mr. Helps came out it started me on a little figuring. I have not the figures with me, but in a general way I can give the results. They were that in a bench of sixes, carbonizing 2,000 pounds of coal per retort per 24 hours, there would be a theoretical saving by recuperation of 400 pounds of coke per day. That is to say, if you put in a generator furnace without recuperation and run it perfectly you use a certain amount of coke in the furnace; if you add recuperators to that furnace and cool the waste gases down to 500° or 600°, there will be effected a saving that should amount to the use of 400 pounds of coke less per day in the generator. In other words, there is that amount of heat in the waste gases going out of the setting, so that anyone can take the price received for coke and see how much 400 pounds are worth to him, and thus see how much he can afford to spend for recuperation to save it. If this saving is not secured by applying good recuperators it is not their fault, it is the fault of the workmen. The recuperator will do the work if properly handled. Another point about regenerative benches and their working which is not very much considered, is the setting. You may have a good furnace, and very good recuperators, and yet every bit of fuel saved by them may be thrown away by putting a poor setting between the furnace and the recuperators. In my experience a bench of sixes that was equipped with a good generator furnace and with very good recuperators, originally used with a certain setting about 24 per cent. of the coke made. That was the best that could be done with it. Without making any change in the retort house force, or any change in the furnace, or in the recuperators, we changed the setting, and the bench, after this change, ran right along using only 19 per cent. of the coke made.

Mr. W. E. Steinwedell—A great many people operating regenerative benches probably have very good benches, but do not give the required amount of attention to their operation. In testing benches the different factors coming in are about three in number. In the operation of a good bench the first point to be considered is the amount of draft lost in the bench. Taking the draft at the inlet to the grate bars and the draft as it goes into the chimney one will find there is a certain difference. The second point is in the analysis of the gases at the entrance to the furnace, and an analysis of the gas as it passes out of the setting. The third point is the amount of coke necessary for heating the bench. In almost all the European works these determinations are made regularly. The gases are analyzed for carbon dioxide, which gives indirectly the amount of carbon monoxide in the furnace gases. You can very easily tell by making that determination whether there are leaks between the secondary air flues and the fire flues, and escaping gases. I think if these determinations were carefully and often made we would have very much better results.

Mr. Forstall—Of course the best way to run regenerative benches is to make frequent analyses of the gases; but unfortunately in this country chemists are rather at a premium in gas works. Not one gas works in 200 ever sees a chemist, and analyzing gases is an awkward job for a man who is not accustomed to it, although very easy for one who knows how to do it. A rough and ready way of arriving at the proper regulation of the secondary air has been described by me in several papers, which nobody seems to read, since no one seems to know anything about it. It consists in taking a point of observation in the waste gas flues as near the take-off flue as possible, and then varying the secondary air supply, first reducing it until a blue flame shows at this point, which indicates that there is not enough secondary air, since

carbonic oxide is going out to the chimney unconsumed. Then, by slowly increasing the secondary air supply (waiting for several minutes after each slight increase for its effect to show), the secondary air can be so adjusted as to obtain complete combustion without any large excess of secondary air. I always consider it better to have a slight excess rather than slight deficiency. In the one case you are merely losing sensible heat, and in the other case you are losing the potential power of the carbonic oxide. As to detecting leaks, close examination of the recuperator should be made right along, by every day or two taking out a few stoppers and looking in to see if there are any jets of air coming in through the blocks. With a little practice you can teach the average stoker to detect and repair such leaks. I do not want to be understood as saying that an analysis is not the best way, for it is certainly the only perfect way; but where you cannot get the analysis by this rule-of-thumb way you can get your bench running so that you will lose very little; you lose no carbonic oxide, and have only a very slight excess of secondary air. One precaution is that the observation must not be taken at a point where the recuperator is so hot that you cannot see the flame. But if it is hot at the take-off point it is an indication that something is wrong.

Mr. Doherty—I fully agree with all Mr. Forstall said, but am afraid he left the impression that analyses made by chemists are much more difficult to make than they really are. In a plant with which I am familiar tests of the gas in the boiler room are made every few days. If the fireman cannot read or write, a very simple test respecting leaks in the recuperative bench can be made by him through simply using two vessels containing alkaline solutions, taking off the gas in the combustion chamber and in the flues, and seeing if the same amount is absorbed in each case. If a less amount is absorbed in the alkaline solution one can feel reasonably sure there is a leak in the recuperators. This paper is certainly a very interesting one, but I am sorry to see the impression gaining ground that perhaps the so-called regenerative benches are not economical. There is no question that they reduce our fuel consumption, and in view of the long life of the recuperator I think the price of fuel has to be very low to enable one to run as cheaply with the old form of bench firing. Another thing that must not be lost sight of is the increased yield per mouthpiece by the recuperative bench. You can get higher flame temperature, and you can economize on your investment and lessen your labor, but whether you reduce the expense materially or not I do not know. I think the normal temperature of the outgoing gases is apt to be very high. Probably 300° would be all that is necessary for sufficient draft, although Mr. Slater states 500° or 600°. Another consideration is the likelihood of adopting a mechanical draft. If we adopt mechanical stokers we are very apt to be compelled to attach the mechanical draft. The maintenance of a mechanical draft is not at all expensive. It is almost insignificant if you can put to useful purpose the otherwise waste heat between the 300° or less to which we might reduce it and the higher temperatures which now prevail. In boiler testing I believe it is always customary to measure the vapor contained in the air. Mr. Slater refers to that. It makes considerable difference whether your atmosphere is heavily or very lightly charged with vapor. The initial temperature of your incoming air also greatly influences the fuel economy. In one test recently made on a boiler plant the theoretical increase in efficiency by the use of pre-heated air should have been 2.3 per cent.; the actual increase was about 15 per cent. This can only be explained by the supposition that the pre-heating caused a higher flame temperature, and that the combustion was more complete. I am inclined to think that in benches we are apt to get the best results by very carefully limiting our secondary air supply. In boiler firing we are apt to get the best results by using double the theoretical amount of air required. The conditions differ in gas benches. The products of combustion are very nearly doubled. They are not reduced below the point of ignition until they reach the stack, and in many cases are not even then reduced below the point of ignition. If exactly the theoretical amount of air is admitted it is very apt to combine before it cools below the point of ignition. An instrument on the market called the econometer I have used successfully on one or two occasions in making determinations of the relative amount of carbonic acid gas, which can very easily be made. In view of the fact that the gas bench is more complicated than the boiler furnace, I think the use of this econometer would be more marked in gas works than in boiler plants. We have, first, a gas producing furnace on our regenerative benches, and then we have a gas consuming furnace—virtually two furnaces—and both have to work in relationship to each other, and also in relationship to all the other natural lines of those two furnaces. I hope a committee to devise simple methods in analyzing flue gases will be appointed, and at the proper time I shall ask an opportunity to make that motion.

Mr. W. E. Steinwedell—I think Mr. Doherty is undoubtedly right in saying that an experienced man is not necessary in making analyses of flue gases, for if retort house foremen are properly instructed they can make them. A very good apparatus on the market to-day consists of two bulbs, the lower filled with an alkaline solution, the other left free to attach to a foot pump. You insert a pipe at the point at which you wish to make the analysis, and by drawing the gas through this upper bulb you get a very fair sample. Then by simply inverting the apparatus and restoring it to its former position you eliminate all the carbon dioxide and get the percentage of carbon dioxide in the gas in a very simple method. A mercurial syphon gauge attached to the upper bulb of the apparatus enables one to read the precentage at once. By bringing the apparatus into the retort house half an hour before making the test, so as to have it of the same temperature as the air in the retort house, you can make the analysis in 30 or 40 seconds. Its use requires no time at all, and comparatively little skill. I would like to say further that this analysis should not be made immediately after clinkering. It is best to wait an hour or two, until the bench reaches its normal state. Benches act very differently immediately after clinkering from what they will later on. In some of the older works you will find that instead of having a stack for each bench they have a flue or breeching running along the back of the stack to a large chimney. In an installation of this kind it is much easier to notice the small blue flames. If you look into one end of the flue you can see very plainly what kind of flames are going out from the benches. If the flame is short and bluish such as Mr. Forstall mentions, you may know that it is about the right kind, and if you are gauging by your eye you can regulate the bench quite exactly. I think it is much better to make an analysis. These analyses are not difficult to make if you have the proper apparatus, and have given to your firemen the necessary instructions.

Mr. Norris—As between laboratory methods and those that we may call practical ones, I must express my sympathy and confidence in the latter. It seems to me there can be nothing much simpler than the method outlined by Mr. Forstall. You have simply to remove a plug and see whether a blue flame appears. The test is conclusive and is thoroughly workable. One thing I would mention particularly, as bearing upon the commercial economy of the regenerator bench as compared with other benches, is that one may take the middle course; for it does not necessarily follow that the most economical plant is the one composed exclusively of either the regenerative or the simple bench. The increased cost of the regenerative bench must increase the interest charge, against which must be balanced the decreased fuel consumption. That decreased fuel consumption is obtained only while the bench is running. The interest charge goes on all the time. Therefore, in order to get the advantage of regeneration, the bench has to be run so that if your plant is such that a considerable portion of it is operated only in the winter time, and perhaps but three months then, and afterwards let down, I do not believe that under ordinary circumstances the economy gained by the three months' running of the full-depth regenerator benches will pay for the interest for the entire year on their greater structural cost. It is a matter I think to be decided in each individual case; but that is the general principle.

Mr. Mitchell—Speaking of tests, I may say I frequently made tests for the proper combustion of gases at the point where the gas went out at the bottom of the retort. Taking out the plug at the bottom I would insert a small pipe (say ¼ inch diameter, 8 or 9 feet long), and blow in it. If the flame followed the end of the pipe it would indicate that there was not enough secondary air. By keeping on with the test I could make the adjustment very nicely and in a practical way.

Mr. Doherty—Replying to Mr. Norris, I thoroughly agree with him about the questionable economy of the regenerator bench for intermittent work; but in recent bids on benches the cheapest bench proved to be the full depth bench. In other words, benches of nines, full-depth, had so much larger capacity and required so much less building, that the total cost of building the benches proved to be a smaller investment than would have been required for the old-fashioned sets for the amount of output required. And, of course, that is what we have to go by.

Mr. Somerville—The matter of mechanical draft, although perhaps not pertinent to the subject, which has been mentioned, always appeared to me to contain great possibilities, but as far as I know it has never been experimented upon. It is a subject which has never been before the Association, and yet the cost of experimenting would be very little. It would require a small engine (which could be used for something else if this did not prove a success), and an exhausting drum. I understand that it requires very little fuel to produce this mechanical

draft. I believe that much of our inferior fuel could be utilized with that kind of a draft. If any of our members are in a position to experiment with an isolated bench in that direction, I wish they would do so, for I am sure we would be very interested at some future meeting of the Association in hearing the result of the experiment. I throw out the suggestion. I am not in a position to do it myself.

Mr. Gimper—The mechanical introduction of air by a secondary draft I may say is an old thing. Over 20 years ago I was in Washington, D. C, to investigate something in that line devised by the late Mr. Geo. A. McIlhenny, who was then managing the gas works there. Later on the plan was abandoned, natural draft chimneys having been found more successful. I have used regenerative benches for over 20 years and have almost forgotten the old fashion. Notwithstanding all the discussion I have heard on the subject I am satisfied I adopted about the best thing, and am using it. The full-depth regenerative bench, in my opinion, is the right system to follow.

Mr. H. C. Slater—We have had the American under-feed stoker in two of our places. It is the same stoker, running two benches. In the first place we put it in an old bench, where it was too far out; but if it did not do any good it did not do any harm. There was no trouble in getting the heat up. The greatest difficulty we had with it was that very large blocks formed in the furnace of hard coal. I used too much slag coal, the proportion being one third slag coal and two-thirds breeze. I think if a larger proportion of breeze were used there would have been less trouble. We have now a new bench, which was only charged in the last two or three days, and have not yet got the results from that, but I hope to get some figures about its working before the meeting adjourns. Mr. Doty spoke about the character of the flame. I really do not see why the flame should be different in using the stoker than in ordinary bench firing. The fire is pretty much the same, although we gasify the coal there, carbonize it, and the gas goes up through the coke on top; in our case the stoker itself, or the fuel, is in the middle position of the old grate, and the fuel gas goes up in there and then turns over on each side. On each side we have a coke fire, and on top we also have one. We have a gas fire next the stoker to carbonize the under side. So far, I have put all the draft through the stoker, sloping in towards the center. I think, however, that later on I shall introduce a primary air supply under each side, the same as we use it in the ordinary coke fire. We admit enough air through the stoker itself to prevent the blocks getting heated, and drive the gas out where we want it. I think the stoker used by Mr. Mitchell is a little different from ours, and I would like to hear from him about it.

Mr. Mitchell—At the suggestion of Mr. Doherty, about a year ago we studied long, at St. Joseph, Mo., on the question of introducing our coal into the furnace in a regular manner by means of a mechanical stoker, and finally devised a plan of charging the furnace by means of a screw, and under the screw we have a hopper. We have been using the machine for about two months, and find that by using slack coal we can get as good results as we did with the best lump coal. That screw is run at about 2½ revolutions per minute, and the coal is forced into the furnace over its top. As the coal goes into the furnace it immediately begins to coke, and as it cokes the screw keeps on shoving it in, until there is formed a great big chunk of coke, 12 or 15 inches in diameter, right at the end of the pipe where it goes in, and then the stoker pushes the piece of coke off and breaks it with his bar. It requires very little labor and is done very quickly. By that means we are able to save considerable in fuel and almost all the labor, except in clinkering. Of course the slag fuel has to be thrown into the hopper. About 2,200 pounds of slag fuel are used in the 24 hours, at a cost of $1.60 per ton. I may say I am well pleased with it, and think we shall put it in the new retort house that we contemplate building next season.

On motion of Mr. Dunbar the thanks of the Association were voted to Mr. Slater for his paper.

Some Fraternal Congratulations and Remembrances.

The President here formally invited the visitors to take part in the proceedings and to make themselves thoroughly at home. In response to this invitation, Mr. George B. Neal, of Charlestown, Mass., spoke as follows:

I am very much obliged, Mr. President, for the cordial invitation you have given visiting gas men to take part in this convention. I wish to say that on last Saturday I attended a meeting of the Guild of Gas Managers, in Boston; and, on motion of Mr. Walter R. Addicks, I was charged with the pleasant duty of conveying to this Association the cordial greeting of the Guild and the hope that this meeting may be a pleasant and a profitable one. I wish also to express my personal pleasure at being present at this meeting. I have never before had the privilege of attending a meeting of the Western Gas Association. I am glad to be here. I see about me the familiar faces of so many friends whom I have met at the conventions of the American, the New England, and the Ohio Associations, that I am almost led to believe that this Western Association includes the membership of all the others. I feel at home with you, and am delighted to be here. I wrote you, Mr. President, stating that I expected to come. I did so because I wanted an invitation, and I did get a very kind one from you.

The President—I am sure I voice the sentiment of every member of the Association in saying we are glad to welcome Mr. Neal to our meeting. And we are very glad to know that he was authorized to bring and express the congratulations and good wishes of the Guild of Gas Managers. I would say in reply that when any of the members of the Guild wish to observe wisdom (or other things) and to have a good time, the Western Gas Association meeting is the place to come to. They will always be welcome, and the doors will always be wide open.

Mr. Doty—I notice we have with us the President of the New England Association of Gas Engineers, Mr. Walter R. Addicks. We would be very glad to hear from him.

The President—Mr. Addicks is also a member of the Western Gas Association, not merely a guest.

Mr. Addicks—I am very proud to belong to the Association, although I have not often had the pleasure of meeting with you. On two occasions only have I attended the meetings—once when Mr. Baxter was President, at the Pittsburgh session, and once at Cleveland. As the President of the New England Association, I desire to say that we wish this Association every success. We know that the Western Association always has good papers that are full of vigor and strength, and we enjoy reading the accounts of your meetings when unable to attend them in person. I wish also to say that we are very proud to have Mr. Neal represent the Guild of Gas Managers. I will say also that the Guild deputized me to act with Mr. Neal in delivering the message.

The President—We certainly get all kinds of expressions. We have telegrams and letters from quite a number of people who express their regret at not being present; and perhaps now is as good a time to read them as any.

The Secretary here read many letters and telegrams regretting that cogent reasons prevented the senders from personal attendance at the meeting. Noteworthy in the list was a letter from ex-Secretary A. W. Littleton, dated Paris, France, the 29th ult.

ROLL CALL.

Roll call disclosed the presence of the following members:

Honorary.

Slater, A. B., Providence, R. I.
Harbison, J. P., Hartford, Conn.
White, W. H., New York City.
Leach H. B., Taunton, Mass.
Howard, J. B., Galena, Ills.

Active.

Addicks, W. R., Boston, Mass.	Douglas, H.W., Ann Arbor, Mich.
Andres, J. F., Belleville, Ills.	Duffield, J. C., Ontario, Can.
Andrews, C. W., Hamilton, O.	Dunbar, C. H., Elgin, Ills.
Averill, G. M., Cedar Rapids, Ia.	Dunbar, J.W., New Albany, Ind.
Baehr, W. A., Denver, Col.	Eaton, W. M., Jackson, Mich.
Barret, A. H., Louisville, Ky.	Egner, F., Norfolk, Va.
Barthold, W.H., G'd. Rapids, Mich.	Evans, C. H., Chicago, Ills.
Bates, T. A., Belvidere, Ills.	Eysenbach, E. E., Columbus, O.
Beardslee, C. S., Cleveland, O.	Eustace, J. H., Chicago, Ills.
Blinks, W. M., Michigan City, Ind.	Faben, C. R., Jr., Toledo, O.
Bredel, F., Milwaukee, Wis.	Farrell, J. H., Wausau, Wis.
Brown, J. S., Danville, Ky.	Ferrier, J., Columbus, Ga.
Buck, E. H., Vincennes, Ind,	Fitz, R. F., Elgin, Ills.
Chollar, B. E., St. Louis, Mo.	Forstall, A. E., New York City.
Christie, W. H., Corning, N. Y.	Frazer, D. H., Battle Creek, Mich.
Church, L., Flint, Mich.	Freese, F. W., Bloomington, Ind.
Chubbuck, H. E, Quincy, Ills.	Gerould, C. L., Galesburg, Ills.
Cooke, A. S., Lockport, N. Y.	Gimper, J., Galveston, Tex.
Corscot, J., Madison, Wis.	Glass, S. J., Milwaukee, Wis.
Cowdery, E. G., Milwaukee, Wis.	Goodnow, G. F., Waukegan, Ills.
Cowdery, R. E., Topeka, Kas.	Green, J., St. Louis, Mo.
Cressler, A. D., Fort Wayne, Ind.	Highlands, S. M., Clinton, Ia.
Dell, J., St. Louis, Mo.	Jenkins, E. H., San Antonio, Tex.
Diall, M. N., Terre Haute, Ind.	Keller, C. M., Columbus, Ind.
Doty, P., Grand Rapids, Mich.	Kellogg, L. L., Sioux City, Ia.
Doherty, H. L., Madison, Wis.	Kincaid, H. E., Jackson, Tenn.

Knight, J. J., Kalamazoo, Mich.	Paullin, W. C., Colo. Springs, Col.
Landon, H. McK., Indianapolis, Ind.	Perkins, B. W., South Bend, Ind.
Little, F. W., Peoria, Ills.	Powell, W. E., Logansport, Ind.
Lynn, J. R., Portsmouth, O.	Pratt, E. G., Des Moines, Ia.
Lynn, J. T., Detroit, Mich.	Ramsdell, G. G., Phila., Pa.
Malone, M. E., Madison, Wis.	Ross, A., St. Louis, Mo.
Mayers, J. A., Columbus, O.	Runner, Z T. F., Freeport, Ills.
McClary, N. A., Chicago, Ills.	Russell, J. T., Jr., Selma, Ala.
McDonald, D., Louisville, Ky.	Salter, J., Florence, Ala.
McDonald, W., Albany, N. Y.	Shelton, F. H., Phila., Pa.
McLean, G., Dubuque, Ia.	Slater, H. C., Milwaukee, Wis.
Miller, T. D., Dallas, Tex.	Somerville, J., Indianapolis, Ind.
Miller, A. S., New York City.	Steinwedell, W., Quincy, Ills.
Morrell, E E., Oak Park, Ills.	Steinwedell, W. E., Belleville, Ills.
Mitchell, K. M., St. Joseph, Mo.	Spencer, F. S., Monmouth, Ills.
Montgomery, J., Sedalia, Mo.	Sweetman, M. M., Kansas City, Mo.
Morgans, W. H., Pontiac, Mich.	Tayler, G. A., Warren, O.
Murdock, G. T., Elkhart, Ind.	Tippey, B. O., Detroit, Mich.
Murdock, J. W., Ottawa, Ills.	Thwing, O. O., St. Louis, Mo.
Murdock, S. T., Lafayette, Ind.	Turner, T., Charleston, S. C.
Nutting, C. H., Chicopee, Mass.	Wallace, W., Lafayette, Ind.
Odiorne, W. H., Springfield, Ills.	Walker, E. M., Hyde Park, Mass.
Olds, H. L., Lincoln, Ills.	Whysall, G. H., Springfield, O.
O'Malley, P., Aurora, Ills.	Witherby, E. E., Lockport, N. Y.
Page, C. H., Jr., Phila., Pa.	Williamson, J., Chicago, Ills.
Palmer, L. T., Leavenworth, Kas.	Woods, G. E., New York City.

Associate.

Bayles, Jas. C., East Orange, N.J.	Hoagland, E. H., Chicago, Ills.
Bingham, S. H., Chicago, Ills.	Jacobs, C. H., Detroit, Mich.
Callenbach, J. A., Milwaukee, Wis.	Johnson, E D., Connersville, Ind.
Carpenter, H. A., Allegheny, Pa.	Lloyd, E. F., Fort Wayne, Ind.
Clark, G. M., Chicago, Ills.	McDonald, D., Albany, N. Y.
Claybourne, C. W., Chicago, Ills.	Mansur, J. H., Royersford, Pa.
Collins, D. J., Phila., Pa.	Morava, W., Chicago, Ills.
Corbus, F. G., Chicago, Ills.	Mordue, T. N., Chicago, Ills.
Dickey, C. H., Baltimore, Md.	Persons, F. R., Toledo, O.
Dickey, P. S., Chicago, Ills.	Roper, G. D., Rockford, Ills.
Eaton, A. B., Chicago, Ills.	Russell, D. R., St. Louis, Mo.
Ellsworth, F. O., Chicago, Ills.	Stacey, J. E., Cincinnati, O.
Gribbel, J., Phila., Pa.	Van Wie, E. G., Detroit, Mich.
Guldlin, O. N., Fort Wayne, Ind.	Waugh, F. K., Chicago, Ills.
Harper, H. D., Chicago, Ills.	Wells, F. K., Chicago, Ills.
Hayward, S. F., New York City.	Wickham, L., St. Louis, Mo.
Helme, W. E., Phila., Pa.	Witherden, G. M., Erie, Pa.
Henderson, E. H., Pittsburg, Pa.	

[To be Continued.]

Vitrified Clay Pipes for Gas and Water Mains.[1]

Reference has already been made in the *Journal* to the use for water supply purposes of pipes made of vitrified clay. The utilization of this material for gas mains was dealt with in an article in the *Iron and Coal Trades Review* for the 6th inst. The author states that the suitability of vitrified clay pipe for the purpose mentioned is due to its possession of the following properties: Cheapness, durability, strength, slight susceptibility to changes of temperature, and non-porosity; and he considers these properties in the order named.

Cheapness.—Vitrified clay pipes can be had, in quantity, in 4 feet lengths, and with large and strong sockets similar to the bowls of cast iron gas pipes, at much lower prices. The 4 feet length would, however, necessitate the making of three times as many cement joints in a line of clay pipes as in a line of cast iron pipes of the usual 12 feet lengths. The following is, therefore, a rough but fair comparison of the costs of a mile of 6-inch vitrified clay and cast iron gas mains, exclusive of excavating and refilling:

	Fire Clay.	Cast Iron.
Cost of pipe in trench, at 3d. and 1s. 5½d. per foot.....	£64	£370
Cost of making 1320 and 440 cement joints, at 12½d. each.	66	22
Total cost.....	£130	£392

For sizes of main larger than 6 inches, the saving would be still greater.

Durability.—Vitrified clay pipes are even more durable than those of cast iron, as they do not rust or corrode. No chemical or substances in the earth, foreign or otherwise, seem to attack them. They are practically indestructible, and retain their strength and non-porosity indefinitely. The author recently examined a piece of vitrified sewer pipe that had been buried for 35 years, which, when cleaned by an experienced sewer pipe manufacturer, could not be distinguished, whether by appearance or any other test, from freshly made pipe.

Strength.—While vitrified clay pipe is not so strong as cast iron, it is nevertheless amply strong for gas mains. These pipes do not break or crush when used for sewers; why should they do so when used for gas mains? The tensile strength of vitrified pipe, whether of fireclay or shale, is astonishingly great. Ordinary single strength 6-inch vitrified fire clay sewer pipes, with walls ⅝ inch thick, withstood an internal hydraulic pressure of from 90 to 120 pounds per square inch; while 6-inch vitrified shale pipes withstood from 140 to 180 pounds—one piece not bursting even at the latter pressure—and 12-inch shale pipes, with walls 1¼ inch thick, have withstood an internal pressure of 220 pounds. A 2 feet length of 4-inch vitrified fire clay pipe selected at random, with walls ½ inch thick, was supported at both ends, and a weight of 2,800 pounds was suspended from the middle of the pipe before it broke. Vitrified clay pipes may be brittle, as are also cast iron pipes; and like them, they can be easily broken by a sharp blow, such as they would never receive when in use as gas mains. But they are extremely strong, and do not readily break under a steady strain, such as they might be subjected to when buried in the earth. The difference between them and cast iron pipes in this particular is not great, and the advantage is only slightly on the side of the cast iron.

Slight Susceptibility to Changes of Temperature.—The relatively high coefficient of expansion of iron constitutes a serious objection to the use of this material for mains. Iron mains frequently break, and their joints generally leak, on account of excessive expansion and contraction of the pipe due to the changes of temperature. On the other hand, the expansion and contraction of vitrified clay pipes, laid at the usual depth of gas mains, would be very slight indeed—in fact, practically *nil*. Although the coefficient of expansion of vitrified clay has apparently never been determined, it is safe to assume that, inasmuch as it partakes more nearly of the nature of common brick than of glass, it is no higher than the average of the coefficients of these two materials, or (say) only one-third that of cast iron.

Non-Porosity.—Vitrified clay pipes are, except possibly at enormous pressures, absolutely impervious to gas, while cast iron pipes are more or less porous at ordinary gas pressures.

All things considered, there really seems to be no reason why pipes made of vitrified clay cannot be used, with satisfaction and great economy, for gas mains. There would appear to be no difficulty in making good tight joints with cement, as the bowls can be formed exactly like those of cast iron gas pipe, with plenty of strength to withstand the calking in of jute or other packing. Of course, the vitrified clay pipe must be selected and laid with care, but not more carefully than cast iron pipe, which is almost as nearly non-elastic, and which needs a firm and solid bearing throughout its entire length. The bottom of the trench should be scooped out to conform to the shape of the clay pipe, the earth should be thoroughly tamped round it, and a thin plank should preferably be laid over it to protect it from puncturing by picks, etc. If the vitrified clay pipe is laid as carefully as cast iron pipe, the breakage due to settlements will be no greater, while that due to expansion and contraction will be less, as will also be the leakage. It may be found best also to use "ring" pipe without sockets, and employ a pitch or other flexible joint.

The following particulars in regard to a line of vitrified pipe to be laid for the supply of water to Hardford (Conn.), recently appeared in the *Engineering Record:*

The water supply of Hartford is obtained from a series of connected reservoirs, which have recently become inadequate for the city's needs. An additional watershed is to be utilized; but, while this is in course of development, it is proposed to prevent the loss of water from existing sources as much as possible. Between two of the basins there is now an open channel about 3 miles long, which is believed to be far from water tight along four-fifths of its route. Mr. Rudolph Hering was recently retained to suggest means of preventing this leakage, and he advises the use of a vitrified pipe line under very slight pressure, although able to withstand a head of 10 feet occasionally, should such a pressure be necessary. The prevention of the leakage through the canal banks and bottom would involve either a masonry or a puddle lining, for it has been found impracticable to prevent it by running muddy water through the channel. Unless masonry is started below the frost line, it will be injured, and thus fail to accomplish its purpose, which makes puddle the only practically useful material under the given conditions. This plan involves puddling the bottom and sides with at least 12 inches of clay, protected with not less than 8 inches of earth. If the work is carefully done, and the material is

1. *Journal of Gas Lighting*.

of the proper kind, the canal will not only become water tight, but the frost will not permanently injure the lining. An estimate of the cost of this work has been made. Assuming that the bottom of the section is only 6 feet wide, and the entire puddled section of it is 22 feet wide, that no additional rock excavation is allowed for, that excavation is estimated at 50 cents per cubic yard and puddling at 8 cents per cubic foot, the cost would be $3 per foot run. Assuming, as before, that 80 per cent. of the canal length required such treatment, the cost would be $36,960.

To repair the canal thoroughly in this manner would cause it to become water tight; but it should be added that the conveyance of water for three miles in a shallow open ditch is not the best sanitary method of dealing with water for a potable supply. The only redeeming feature of this particular canal is the collection of rain water from a strip of territory draining into it, amounting to from one-half to two-thirds of a square mile. In view of the intention to increase the water supply for the city in other directions, this gain is not material. The aëration of the water in the ditch is of no advantage after the much greater aëration it has received in the large reservoir. It will not take out the sold organic matter or destroy bacteria. It removes iron when the water is impregnated with it, and gases when the water is polluted. For these reasons, it is held that a more satisfactory means of conveying the water from one basin to the other is afforded by closed conduits, in which the water is protected from dirt and heat—the latter a matter of some importance where the depth of the water is slight.

If the total available head between the two reservoirs is utilized, then cast iron pipe must be employed, according to Mr. Herring. If the head is not greater than 10 feet, then carefully selected and well jointed double strength vitrified pipe will answer. The latter is imperishable, and will retain a smooth interior; thus retaining also its original discharging capacity. Iron pipe will become tuberculated inside, and thus generally and gradually have its discharging capacity reduced. On account of this fact, and of the greater economy of vitrified pipe, the latter is given the preference in the Hartford case, even though a less head, and therefore a smaller discharge, is obtained by it. If the vitrified pipes are well selected, so as to fit without interior projections of more than ⅛ inch, and thus reduce the fractional coefficient to a practical minimum (Kutter's $n = 0.012$), the pipe, if laid at the lighter grade, will discharge 5,823,000 gallons per day; if laid with the better grade, it would discharge 8,583,000 gallons per day. In both cases it is assumed that the pipe does not run under a head. By giving the water a head of 10 feet above the pipe at its upper end (the greatest head to which it should ever be subjected) the discharge would respectively be 7,064,000 and 9,417,000 gallons per day. The estimated cost of the pipe of smaller capacity is $31,500, and that of the other $33,000. The latter was recommended; and the Water Board have decided to build it. The difference between its first cost and the expense of puddling the old canal is not the only favorable feature it presents. It will still leave the canal free to collect the run off from the adjoining district in times of drought; it will protect the water from injurious influences, as before stated; and it will be less expensive in maintenance and repairs.

Repairing a Thirty Inch Submerged Water Main.

[From a paper read by Mr. D. W. French, at the Richmond (Va.) Meeting of the Am. Water Works Association.]

The 30-inch main which forms the subject of this paper is one of three force mains which connect the principal pumping station of the Hackensack Water Company, reorganized, with their reservoirs at Weehawken, N. J., the distance between the two points being practically 14 miles. The main in question is not laid the entire distance between the pumping station and reservoirs, but is connected to a 20 and 24-inch main at Ridgefield, N. J., 10 miles from the pumping station.

The 30-inch main was laid during the season of 1897 and 1898, and after being carefully tested between each gate as the work progressed, was put into use in April, 1898, and continued in service without any interruption until the afternoon of August 19, 1898. Then the pressure of 102 pounds at the pumping station against which the engines were working, suddenly dropped so low that it was evident that a serious break had taken place somewhere on one of the force mains.

The three force mains referred to extend over a distance of practically 40 miles, and at several intersections are connected with each other. At the time the break occurred the engines were running with these connections all open in order to reduce the working pressure as much as possible, and, consequently, the cost of operation. As the distance to be covered was so great, considerable time was consumed by the men in getting to the gates which had to be closed, but as soon as the connections were closed, which enabled us to prove each main separately, the difficulty was found to be with the 30-inch main, and the break was finally located at a river crossing, on the bed of which the main lies, and over which there was 11 feet of water at low tide.

With the 30 inch main out of commission and crippled in a place making the repairs a question of weeks rather than days, with the daily consumption over a million gallons greater than what could be delivered through the 20 and 24 inch mains, even after raising the pressure to 120 pounds, and with a stock on hand of 20,000,000 gallons, it was decidedly too evident for comfort that either more water must be delivered into the reservoirs at Weehawken than it was then possible to do, running at the pressure named on the 20 and 24-inch mains, or else to prepare for a water famine as gracefully as possible.

About 2,500 feet north from where the break occurred, the street on which the 30 inch main is laid intersects a turnpike, along which the 20-inch main lies, and from this point south the mains parallel each other for practically a mile. Three hundred feet north from this point of intersection there is a gate on the 30 inch main, which is the first gate north of the break, and was consequently closed. I felt positive that if the 20-inch main was connected to a point on the 30 inch above the closed gate, and delivered through the 30-inch from the pumping station into the 20 inch at this point, that the advantage would be the loss of friction between these two points, and would result in an increased delivery of from 2,500,000 to 3,000,000 gallons per day.

As we were fortunate enough to have sufficient material on hand to make this connection, which required 300 feet of 20-inch pipe, a 30x30x20 inch branch, a 20x20x20 inch branch, a 20-inch gate, bends, etc., work was commenced early the next morning, and, by working continously with alternate gangs, was completed late in the night of the following day.

After this connection was opened, we were able to deliver 12,500,000 gallons per day at 120 pounds pressure, which showed the effective value of the by-pass to be 3,150,000 gallons per day. The value of the by pass was also emphasized a week later when, due to the exceedingly warm and dry weather, the daily consumption exceeded 13,000,000 gallons.

The method adopted in making the repair to the 30-inch main is not based upon any established precedent, so far as I know, but upon what seemed to be the best, quickest and cheapest way to accomplish the result. It seemed practicable to make the repair in two ways; either by sinking a caisson in the usual manner, or by raising the pipe from the bed of the river high enough above low tide to permit the removal of the broken length, and the substitution of a new one. After viewing the case from all sides, it seemed that the latter method was practicable, and that it could be done more quickly and for less money than the former.

After engaging a pile driver, scow, tackle, diver and his apparatus, and making provisions for such other requirements as were needed, the work was commenced. On the first examination, the diver reported that he had found the broken pipe, which was of the Ward joint type, cracked on the bell end, parallel with the axis of the pipe and very near the top, that the slit followed along the pipe for about 3 feet, then turned at an angle of about 90°, and passed around the pipe for a distance of about 3 feet. He reported that the opening was 1½ to 2 inches wide.

The river across which the pipe lies is practically 500 feet wide, but the location of the broken pipe was about 100 feet from the north shore at low tide, and exactly in front of a draw in a bridge which crosses the river at this point. In general the method of operation decided upon was to drive piles in bents, in the center of each length of pipe, from the shore out to the break, cap the piles with 12x12 inch yellow pine, break out a length on shore above tide, and raise the pipe gradually and intact about 3 feet above low water, and hold it suspended while the broken length was removed and a new one substituted.

In order to faciliate the work, it was first necessary that the pipe be free to move endwise on the shore end, otherwise, in raising the pipe from its bed, we would be lifting against an inverted arch. Some difficulty was experienced in breaking the shore pipe, which is 1½ inches thick, and weighs 550 pounds per foot, but it was finally accomplished, after several unsuccessful attempts, by the use of dynamite.

As soon as the piles were driven and capped, the diver passed a heavy chain around the center of each length, to which was hooked a 3 sheave block and fall, which was hung from an eye-bolt in the cap-piece on top of the piles. When everything was in readiness, the process of lifting was commenced, which required a considerable time, as only a short lift could be taken at any one time, and every change

from one tackle to another involved the moving of the pile driver from which power was taken. Measurements were taken almost continuously from the surface of the water, which served as a good level, in order to guide the work, and to be sure that the joints were not being unequally stained.

Some difficulty was experienced in starting the pipe from the bed of the river, but after it was started the lifting continued until the pipe was several feet above the bed of the river, and the weight, which represented 60,000 pounds, was supported by the piles and capping. By rigging another block and fall from the shore end of the pipe, which was now suspended, to the main land, very little difficulty was met with in separating the 2 lengths, as the crack in the bell was about 2 inches wide and did not therefore offer much resistance.

After this was done the broken pipe was raised until it was about 3 feet above low tide, which enabled us to cut off the broken pipe and remove the spigot from the adjoining bell. With this part of the work done it now remained to raise the end still lying on the bed of the river to the same level as the first section, which was accomplished by driving 14 more piles in 7 bents, capping them as in the previous case, and by repeating the operation of lifting.

After the pipe was raised to the proper level, a new length was put in place, the joints run, and the work was ready for the final lowering. As the pipe when ready to lower formed an arch, the radius of which was about 100 feet, and in its descent the arch must necessarily be reversed, it was absolutely necessary to keep the pipe, from the break in shore, suspended so that it would be free to travel endwise, until the balance of the picked up section was down on the bed of the river, after which the inshore end was lowered into place. Before making the final connection on shore, the end of the pipe was plugged and the section in the river was tested for leakage.

After the pressure had remained full on for an hour or more, it was turned off, and the falling off of the pressure as shown by the gauge was a satisfactory evidence that there was some leakage at the joints, due to their movements in raising and lowering. These leaks, which were several in number and all small, were found and made tight by the diver. After the testing was completed the final connection was made, and the main again put into commission on April 8, the repairs having been made in 15 days, at an actual cost of $2,258.43. The cost of material and labor for making the by-pass connection was $1,300.34, so that the total cost amounted to $3,558.77.

When the break in the river took place, it was accompanied by an effect which, in my experience, was unusual. The distance, as stated before, between the pumping station and the break, is practically 10 miles south, and yet about 1 mile north from the pumping station a 12 inch main was broken, and 1½ miles south two 6 inch mains were broken, simultaneously.

The Carbonization of Cannel and Shales for Gas Making Purposes.

[A paper read by MR. S. GLOVER, St. Helens, England, at the Tenth Annual Meeting of the Incorporated Institution of Gas Engineers.]

The main object in using cannel in the ordinary manufacture of illuminating gas is to increase the illuminating power. The removal of naphthaline happens to be an accompanying advantage. The volume of the cannel gas is not so material an object as enrichment. This is shown by the fact that benzole (which adds an exceedingly small volume to the gas) is in many cases used in preference to cannel. In carbonizing cannel it is therefore evident that the primary object to aim at is not production of volume, but to carbonize it at such a temperature as will produce the maximum enrichment value. It does not pay to crack up the valuable enriching hydrocarbons to obtain volume of gas, for this can be obtained much more cheaply from the ordinary gas coals.

As you are aware, cannel coal and bituminous shales (such as are used to enrich coal gas) when destructively distilled or carbonized at the lowest possible temperatures, yield what is known as paraffine or shale oil. These oils contain such a small quantity of acid and basic hydrocarbons, and such a large quantity of hydrocarbons belonging to the paraffine and olefiant group of hydrocarbons, that they can be economically used for the production of lamp oil and paraffine wax. Ordinary bituminous gas coals when similarly carbonized at low temperatures, owing to their different structural constitution and percentages of the carbon, hydrogen, oxygen, nitrogen, etc., which they contain, yield very different kinds of oily products, and these contain such a low percentage of the paraffine and olefiant group of hydrocarbons, and such a large proportion of acid, basic, and other series of hydrocarbons that have to be removed by chemicals, that they cannot be economically used in the manufacture of lamp oil and paraffine wax.

When oils from shale or cannel are cracked up in retorts at gradually increasing temperatures the volume of gas increases with the rises of temperatures, and for a time (at the lower temperatures) so also does the illuminating power, or at least it does not decrease. But as the temperature is further raised and the volume of gas increases the illuminating power begins to decrease, but for a time it does not decrease so quickly as the volume increases, and consequently the gross illuminating value of the gas obtained from the oil continues to increase. At still higher temperatures the illuminating power begins to decrease more quickly than the volume increases, when, of course, the gross illuminating value of the gas obtained from the oil is distinctly less. In carbonizing oil by itself the aim would, therefore, be to carbonize it at the temperature at which the volume and illuminating power were balanced; that is, when one portion of the oil had been cracked up into volume of gas to take up the remaining sufficiently volatile hydrocarbon vapors in diffusion and prevent them being deposited in the tar.

Now it is evident that when the gas was of highest illuminating power, and the volume of gas small, the tars would be largest in quantity and extremely rich in condensible vapors, for the illuminating power of the gas and the quality of the tars condensing from it bear a definite relation to each other, gas rich in illuminants, when condensed, depositing tars rich in illuminating vapors. To render these illuminating vapors directly valuable to the gas manufacturer it is necessary to bring gas in contact with them to take them up in diffusion, and one method adopted to get that gas is to use a higher temperature in the carbonization of the oil; but as that gas is obtained to a large extent by the cracking up of what at the lower temperature would go to form the denser part of the tars, and as not only gas, but also certain quantities of volatile illuminating vapors are produced, the loss is more than balanced by the gross gain. As the temperrture of carbonization rises higher, however, the denser portions of the tar become more stable, and are not so readily cracked up into gas, and the illuminating vapors are themselves cracked up to a greater extent, until a temperature is reached when the volume of gas produced exceeds that required to take up the illuminating vapor simultaneously produced in diffusion, when the gross illuminating power of the gas obtained from the oil is diminished.

When carbonizing oil by itself, or shale or cannel by themselves, for the production of gas, it is, therefore, evident that the best temperature to employ is that which cracks up the constituents of the oil, shale or cannel in such a manner that there is produced a balance between volume of gas and the illuminating hydrocarbon vapors that can be taken up in diffusion through the gas. These facts are very clearly demonstrated by the results obtained from a series of experiments made by Mr. Price, under the direction of Mr. Hunt, at the Windsor Street gas works, Birmingham, and published in the Transactions of the Institution of Gas Engineers, year 1892. The following is an extract from the tabulated results given:

	Russian Oils.							Shale Oils.			
	A. Luster.				B. Solar Distillate.			C. As supplied to Railway and Tramway Companies.		D. Obtained Direct.	
	1	2	3	4	1	2	3	1	2	1	2
Mean temperature of retort.....	1177	1410	1570	1592	1380	1445	1690	1521	1628	1447	1630
Gas produced in cubic feet per gallon oil.....	44.3	74.5	101.3	117.1	58.0	82.9	120.3	82.5	94 6	66 6	83 1
Illuminating power	30 8	49.6	35.7	25 0	58 0	48.2	22.0	41.2	34.3	62 9	46 3
Multiple	1364	3695	3616	2927	3364	3996	2646	3390	3245	4189	3847
Condensed liquid products (fluid ozs. per gallon)..	89.5	26.5	4.1	0.5	52.4	65.5	0.5	32.2	9.5	43.2	16 2

Mr. Price remarks regarding the above table: "It would appear from these experiments that at a particular temperature the oils give the best results. At temperatures below this the value of the gas falls off, and

notwithstanding the increased volume at higher temperatures the value is also less."

The conditions are very different when the volume of gas is supplied from a source outside the oil or the cannel. It is then no longer necessary to crack up a portion of the oil or cannel to produce volume, the object being to produce the maximum possible quantity of hydrocarbons capable of enriching the volume of gas from outside sources. The temperature at which it is necessary to carbonize the oil or cannel to produce this latter result of maximum enrichment value is very much lower than that necessary to produce the maximum illuminating value from the oil or cannel carbonized alone. The maximum illuminating value is obtained from the oil or cannel when the temperature of carbonization reaches the point at which the multiple of volume of gas and the illuminating power of the gas is at the maximum. The largest enrichment value obtainable from the oil carbonized by itself to produce the maximum of illuminating value to be thereafter mixed with coal gas is from 900 to 1,000 candles per gallon of oil. On the other hand, when the oils are carbonized at a lower temperature so as to produce the maximum quantity of enriching hydrocarbons and the gas to be enriched brought into contact with these enriching hydrocarbons, there may be obtained an enriching value of 1,400 to 1,600 candles per gallon of oil.

When the oily products obtained from the carbonizing of bituminous gas coals are cracked up, at gradually increasing temperatures, results very similar to those got from the shale oils are obtained at first, that is, at the lower temperatures, but owing to the much smaller quantity of paraffines and olefines, in proportion to the other hydrocarbons present in these oily products from the coal, and from the different manner in which these other hydrocarbons crack up, the gas obtained is at no temperature of the same illuminating power as that got from the cannel or shale oils, and the maximum illuminating power is reached before the paraffines present in the oily products have been all cracked up. On the other hand, however, the illuminating power of the gas does not fall away so quickly with increased temperatures of carbonization as is the case with cannel or shale oils, and the gross illuminating value continues to rise, and it is only when the temperatures are so high as to begin to crack up the highly stable benzole that the gross illuminating value falls away. The temperature which is necessary to carbonize gas coals, to produce volume of gas combined with the gross illuminating value, is therefore very much higher than that suitable to carbonize cannel, to obtain from it the maximum of enriching hydrocarbons. It is, therefore, evident that to carbonize cannel at those high heats a large part of the enriching value must be lost, and therefore the convenience of carbonizing both together at the higher heat involves very considerable loss of enriching products.

The next point to consider is the method of bringing the large volume of gas from the coal and the enriching hydrocarbons from the oil or cannel into contact, as the manner in which that is effected has a considerable influence both upon the enrichment obtained and upon the removal of the naphthaline. By the usual method of using cannel, carbonizing it along with or at least at about the same temperature as the coals, the cannel is not only overcracked up, but the resulting overdecomposed products are passed into and mixed with the whole of the products from the bituminous coal. The bituminous coal products contain large quantities of naphthaline, and also oils having a powerful solvent affinity for the volatile illuminating hydrocarbons; each 10,000 to 11,000 cubic feet of bituminous coal gas being accompanied by from 10 pounds to 14 pounds of the former and from 60 pounds to 80 pounds of the latter. During the process of condensation, the illuminating volatile vapors present in the products from the cannel are necessarily more or less subjected to the solvent influence of the coal tar, by which some of the illuminating vapors are absorbed, and the enormous quantity of naphthaline is sufficient to practically saturate the liquid tars from both cannel and bituminous coals, unless the proportion of cannel is very large. It is thus seen that by the usual method of using the cannel its full enrichment value is not obtained; the temperature at which it is carbonized is much higher than that necessary to produce the maximum yield of products capable of enriching the large volume of bituminous gases, and the condensed tars from the cannels are less able to act as solvents for the naphthaline, and both these losses are still further increased during the process of condensation, in the manner to which reference has just been made.

By carbonizing the cannel separately, the temperature best suited to the particular cannel used can be adjusted to produce the higher yield of enrichment, and by separately condensing the products out of the gas produced from the bituminous coal carbonized at high temperatures, the accompanying naphthaline and solvent oils are nearly all removed, not one-hundredth part of the naphthaline being left in diffusion in the gas. On bringing the gas so purified from condensible products into intimate contact with the products from the cannel carbonized at the lower temperature the gases are free to take up their full load of carburetting hydrocarbons present in the cannel products, and the denser hydrocarbons from the cannel, being practically free from naphthaline themselves, form excellent solvents for the naphthaline still present after condensation in the large volume of high temperature gases. The great advantage to be derived from the separate carbonization of the coal to produce volume, and of the cannel to produce enrichment, and the separate condensation of the high temperature gases and their subsequent contact and treatment with the cannel products are thus fairly evident.

It gives me peculiar pleasure in concluding this paper to draw attention to some statements made by the late Mr. John Methven, in 1892, which, looked at from the standpoint of our late experiences, seem to to have been quite prophetic: "I have made some experiments, on the subject dealt with by the papers we have heard this afternoon, which have convinced me that it is absolutely necessary, before we can get an economical result, to have a proper and effectual conveyor for the oils when they are cracked up. My first experiments were made by mixing different oils with coal in an experimental retort, and I was very much disappointed with the low result of illuminating power which I obtained from that process. Repeated experiments eventually convinced me that there was some mischievous operation going on in the hydraulic main—that one of the hydrocarbons (possibly a heavier one) laid hold of the lighter ones which came off from the oil, and consequently absorbed the light giving properties of the mixture. I extended my experiments with the view of forming a conveyor or carrier for these hydrocarbons. Oil was injected into the retort by means of superheated steam; the oil gas and coal gas being made alternately and mixed in the holder. These experiments gave better results than the first series; but still they were unsatisfactory, some of the hydrocarbons or light-giving material being lost. The next set of experiments I conducted were by passing purified coal gas into the ascension pipe of the retort in which the oil was being carbonized or cracked up. I may say that this series of experiments gave very much the best results. At first we put the purified gas into the retort itself; but we found a decided loss took place from the action of the heated iron of the retort on the gas, so that plan was abandoned. Next, we conveyed a measured quantity of coal gas of known illuminating power into the ascension pipe, where it met the vapors coming off from the oil, and I must say that the experiment gave results which were extremely satisfactory. I was hopeful of being able to try the experiment on a large scale before this meeting, and that I should have had some figures to lay before the members. But on some future occasion I hope to be able to do so. I cannot help thinking that this is the direction in which we must look for the economical use of oils as an enricher. There must be a conveyor for it. If we crack it up and put it with the gas in the hydraulic main, the heavy hydrocarbons in the uncondensed gas—the tar, and so forth—absorb the light-giving properties of the oil, a great deal of which is thus lost; but by providing at once a suitable conveyor, freed from absorbent hydrocarbons, a permanent gas can be made with very economical results."

The results obtained at St. Helens throughout the last 2½ years' continuous working with cannel carbonized at suitable temperatures in separate retorts, and mixed as described in the paper communicated by my brother and myself in 1898, have enabled us to enrich our gas (the bulk of which is made from the cheapest quality of coal) in the most economical and satisfactory manner. I desire to acknowledge the help of my friend, Mr. William Young, of Peebles, in the investigation of this subject; he has guided me with his extensive and varied experience in my search for a natural remedy for naphthaline troubles. In adopting the lower temperature for carbonizing cannel we expected to get some amount of additional enrichment, as well as obtain solvents and carriers for naphthaline. The working results have more than realized our highest expectations, and I hope to have the pleasure of submitting some further experiences upon another occasion.

Mr. A. H. Jones, Superintendent of the United Gas, Electric Light and Fuel Company, of Sandy Hill and Fort Edward, N. Y., says that the Company's new plant is about ready to be put in operation, and that it is "in the market for fixtures and all supplies." The officers of the Company are: President, Wm. C. Hendrickson; Vice-President, James D. Sherrill; Secretary, James E. Flood; Treasurer, Jno. L. Wentz.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, May 10, 1900.

The Pay and Position of Gas Works Managers.—Coal.—Street Lighting in London.

There was a time, not so very long ago, when the manager of a gas works was regarded by his friends as a fortunate individual, secure in a comfortable situation for the remainder of his active business life and with fair prospects of liberal consideration when the time comes, in the ordinary course of nature, for retirement to the arm chair by the parlor fire at home. But a new order of things is now being heralded. It is said that one of the evils of gambling is that it makes men unsympathetic for the losers. I question whether that vice is more active in dwarfing and cutting off feelings of sympathy, to say nothing of any sense of duty, towards the old servant now past the zenith of activity and usefulness, who has grown gray in the service of his employers, than the keen, unscrupulous competition that is such a marked feature of modern business life. Even betting men are more considerate to each other than some employers to their servants, and following the general rule, the relationship between the manager and his board of directors is tending to move in a direction that calls for the careful consideration of the middle aged manager of gas works, who has put all his professional eggs into the gas engineering basket and has no resources to fall back upon if his present position should fail. The feelings of friendliness and good fellowship, of personal sympathy and respect, that have hitherto characterized the dealings between the manager and the board, tend to give way in favor of the hard and grinding rules of buying and selling, which place muscle and brain power in the same category as coals or other material. So the gas manager of to day must be prepared to stand aside whenever the market equivalent of his professional services can be obtained to better advantage elsewhere.

Directors and shareholders do not hesitate to know that the staff should be composed of young men entirely, and that liability to old age pensions should be avoided by taking care not to keep anyone too long. But what is going to be the effect of this doctrine if it acquires anything like general acceptance. The extension of the gas industry has brought in a large number of young men to fill subordinate positions, and many of these hope to rise to the top of the tree some day. The educational facilities now obtaining in our principal towns enable any industrious young man to qualify himself in chemistry, engineering drawing, etc., by attending evening classes, without interfering with his business engagements. Any advertisement announcing that a gas manager is required, brings in shoals of replies from persons of this class, who are willing to accept a bare living wage, or little better. It is true that purely technical qualifications are to some extent merely tinsel as compared with the genuine article, being deficient in respect to experience with workmen, or consumers, or that mature judgment which is indispensable to the efficient filling of a responsible position. But the cutting business man does not stand very carefully about distinguishing between one and the other. A penny saved is a penny gained, is his motto, regardless of the fact that the truth of the proverb hinges entirely upon the cost of the saving process, and so he goes head and ears for the cheapest man, just as he would go for cheap coal or iron.

A general impression gets abroad that efficient managers can be had for "next to nothing, and find themselves," which has a far reaching effect in setting the tune elsewhere, as regards the average salary paid. The duties and responsibilities attaching to the management of a gas company have increased and expanded during late years, but the cases of a proportionate expansion as regards salary are few and far between, and the gas manager of to day is worse paid than his predecessor of 20 years ago. He works longer hours, all necessaries of life are higher in price, and he is worse off than would appear from the salary alone. A popular ballad of the day sets forth that a soldier did not ask leave to marry because he knew he would not get it, and many competent gas managers know that a request for an addition to salary would be met by a hint that 100 applicants are waiting to take the position at less money. And if they choose to try for another appointment, they are simply regarded as one of the horde, and unless they can command personal influence the chances are against their applications being adequately considered. Whether the cheap man, stimulated into unnatural and short lived energy by the Damocles sword of a three months' notice hanging over his head, is likely to make a more prosperous showing, or is physically and mentally qualified to work to better advantage than a competent, experienced man who is personally respected and adequately paid, and feels comfortably settled in to a respectable life work, is a point that I do not care to discuss. Only a few weeks ago the fact incidentally transpired that the salary paid to the holder of one of the most important appointments in the kingdom was out of all proportion to the services rendered. Recent advertisements also seem to run in the direction of expecting a great deal for the money. Candidates for the honors of gas managership are guided more by the past, than by what the position is or what it will be. And I cannot think that the new order of things is an advance, either in the interests of the profession or of the gas industry at large.

Not only is the tendency towards a reduction of salary, but also to more onerous conditions of labor, and the manager is required to be at hand day or night, and to work 12 hours a day for an equivalent perhaps twice as much as is paid to one of his stokers, who is quite his own master for 16 hours out of the 24. That ambiguous clause, requiring him to devote his "whole time" to the duties would seem to be sufficiently binding for the proprietors. From the other side it is objectionable as placing the official entirely at the mercy of any arbitrary or tyranically disposed director. But a North Country Gas Committee are entitled to the honor of going one better. They want whole time and also the designing and carrying out of all extensions, of which a plentiful crop is in hand, and thus get the gas works managed at a profit, as the candidate will save engineering fees equivalent to double the salary. They also claim the right to order where he is to reside, although they pay no house rent, and further specify that he is not to leave the town without permission. The last clause is particularly objectionable, and the Committee would not dare to propose it to a laborer or artisan. The much abused but indispensable "slavey," gets her day or evening out, and woe be to that mistress who dares to encroach in any way upon the hours of leave. Soldiers, sailors, policemen, all have their off-time, and shop assistants the early closing afternoon in each week. And yet the gas manager, with his continual strain and no closing day, with frequent night, sabbath and holiday labor, must not go outside his district. After several hours attention at the works to some special defect, and getting half choked with smoke and poisoned with gas, he must not pull himself together and dispel the inevitable headache by a good spin into the open country on his bicycle without first begging, hat in hand, for the necessary permit. The Committee have every right as regards fair business hours, but no precedent whatever for this flagrant attempt to curtail the liberty of the subject. And if candidates are willing to accept such conditions it is time for gas managers in general to stand up for their rights.

Coal is still the burning question of the day, and there appears to be a very strong combination all round, with the object of forcing the market value of all kinds of gas coals. Some contracts are already placed, but the terms are not exactly known, though it is understood that a considerable advance has been accepted. The tightness in coal seems to have extended to all parts of the world and is obviously due to the demand exceeding the supply. It is a general rule in political economy that an advance in the price of an article tends to reduce the demand. Consumers turn to other things that will answer the same purpose; some users find themselves in the happy position of being able to wait for better times, invention in the direction of economizing appliances is encouraged, the consumption is looked after with closer care and attention, and many little sources of leakage or wasteful usage are discovered and stopped. Those who have studied the favorite problem of the duration of the coal supply agree that when the price rises the consumption will fall. But here we are, face to face with the fact that although the world's output of coal has been more than trebled within the last 30 years, while liquid fuel has been brought into use to a large extent, and natural gas has also been utilized, the prospects of a general coal famine were never so probable than at the present time. Consumers in all parts of the world will have coal, disregardless of price, and many of them appear to have more pressing employment than the consideration of economy in its use, or of making two tons do the work of three. The causes of this abnormal increase are outside gas circles, but are to be traced chiefly to general prosperity and good trade. There is a large increase in the production of iron and steel, and coal is not only used for the smelting of the ore, but for treating the metal afterwards, and that is not the end of it, as a large proportion of the metal will probably be worked up into engines and machinery that require a steady consumption of coal to enable them to be utilized. The hardware dealer would rather sell an oil lamp than a gas pendant, because the purchaser of the lamp may possibly become a regular customer for oil, and the coal merchant may reasonably re-

gard coal used for smelting ore in a similar light. The demand for iron and steel is caused by the enormous increase in the methods of transit, both on land and sea. Wherever we go the railways are being increased and new schemes are in progress. Modern ocean going vessels swallow up enormous quantities of coal. Then there is not only the development of manufacturing consumption, but the expansion of population and of the number of habitable buildings must increase the quantity used for household purposes. One authority says that the greater diffusion of wealth means more coal used, but I have always observed that the poorer classes are the most extravagant in the matter of fuel. Most of these causes are more or less permanent in character, and, therefore, it appears that the prospects of cheap coal are remote. The rise in price will, of course, encourage production, lead to the opening up of new mines, and so on, but in the face of the figures above quoted, there is not much to hope for from this source.

But one may ask, why should gas companies take the advanced price of coal so seriously? Other manufacturers also have to encounter the same difficulty. The answer lies in the fact that the general manufacturer does not bear the burden himself, but immediately shunts it on to his customers, who for the most part accept the same in good part. Gas companies have been straining for years in the direction of cheap gas. Every trifle that can be saved in manufacturing, in purifying, in distributing, is scraped together and given to the customers. There is a natural hesitation to reverse this policy, which has led to considerable nervousness, perhaps more than is justifiable, as to the effect of a rise in price. Already several are trying the experiment, and the effect of a good round advance, say 6d. per 1,000, on the quantity consumed will shortly be in evidence. People who do not kick at 30 shillings per ton for coal should not be over parsimonious about a 10 per cent. advance in gas, and it may turn out that the gas consumers are more willing to accept a fair share of the burden than has been supposed.

The reports on street lighting, as issued by the public health department of the corporation of London, are always interesting reading. That for the year 1899 is no exception to the rule. It contains some information as to incandescent gas lighting experiments, which show that the Welsbach is not only cheaper than the old flat flame, but gives six times as much light. There are 1,906 gas lamps and 507 arc lamps in the area under the jurisdiction of the corporation and the numbers of defective lights were about in inverse proportion, being 192 for gas, or about 10 per cent. on the number of lamps, as against 896, or 190 per cent., for the arc lamps. The Kern burners (Welsbach new pattern) receive favorable mention as a great improvement on the old system of lighting.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. C. C. BAYLY has been appointed Superintendent of the Alexandria (Va.) municipal gas plant.

AT the annual meeting of the Bristol (Pa.) Gas Light Company the officers elected were: Directors, L. A. Hoguet, James Buckman, H. Purcell, H. B. Beatty and Edward Swain; President, L. A. Hoguet; Secretary, H. Pursell; Treasurer, H. B. Beatty.

THE Gas Light Company, of Waverly, N. Y., which also operates the gas plants at Athens and Sayre, Pa., has been purchased by Mr. W. T. Morris and associates, of Penn Yan, N. Y. Mr. Morris has been elected President, replacing Mr. W. H. Fritchman, and Mr. A. N. Lyfert succeeds Mr. H. A. Decker as Secretary.

MR. SAMUEL ROBERTS, formerly with the Johnstown and Gloversville (N. Y.) Gas Company, has accepted the place of plumbing inspector to the city of Johnstown.

ONE result of the reorganization of the Carbondale (Pa.) Gas Company is an announcement by its proprietors that the net selling rate is to be $1.65 per 1,000, until further notice. This is a concession of 65 cents per 1,000.

NEGOTIATIONS for the sale of the La Porte (Ind.) Gas and Coke Company to Chicago capitalists have been virtually concluded.

MR. THOMAS O. HORTON, of Philadelphia, has been appointed Superintendent of the Niagara Falls (N. Y.) Gas and Electric Light Company.

AT a meeting of the Board of Managers of the Media (Pa.) Gas Company it was decided to reduce the selling rate to $1.50 per 1,000 cubic feet, and that bills shall hereafter be rendered monthly. A committee was appointed to make the necessary examination to determine what extensions should be made to the main system.

IT is said that Mr. Thomas Gahan is slated to succeed Mr. Roger C. Sullivan as President of the Ogden Gas Company, of Chicago. It is also understood that a new Board of Directors will be chosen, the majority of whom will be in sympathy with the aims and purposes of the Peoples Gas Light and Coke Company.

THE Knoxville (Tenn.) Company proposes to erect a handsome office building on the site of its present headquarters.

A SEMI ANNUAL dividend of 2½ per cent. is payable on the preferred stock of the Laclede Gas Light Company on and after the 15th of June.

THE plant of the Catskill (N. Y.) Gas Light Company is to be rebuilt.

THE reorganization of the Butte (Montana) Gas Light and Coke Company has been perfected. The official title of the corporation is that of the Butte Gas Light and Fuel Company.

THE following circular has been given wide circulation amongst the shareholders of the Consolidated Gas Company, of Baltimore:

"It is rumored that the Board of Directors of the Consolidated Gas Company would be willing to submit to the stockholders a proposition to sell the capital stock of said Company at a price which, in my judgment, is far below the value of said stock, and it can be easily understood what large profits could be made by any party buying control of the above mentioned stock, as they would obtain a valuable franchise at a price far below its real value. As I have repeatedly shown to parties having large interests in the stock of this Company, the opportunity is now present in Baltimore city to make the capital stock of the Consolidated Gas Company sell at par or even higher on its earning capacity alone; but it is sufficient, however, to state here that within a reasonable time by the use of progressive and active management this Company should—and in my judgment will, as derived from my knowledge of the success of gas companies in other cities—approximately double its output of gas, and be able to furnish it to the people of Baltimore city for $1 per 1,000 cubic feet, and even at a less charge for fuel purposes by scaling the rate to meet the latter demand according to the quantity of gas consumed. I make this appeal to the stockholders of the Consolidated Gas Company not to sell their stock to any syndicate at a sacrifice, and, representing as I do a great many shares, I will cheerfully supply all information and data on this subject to the present stockholders, showing them why I make this statement, and wherein it would be to their future advantage to have the Consolidated Gas Company managed on broad and progressive lines as are the other large gas interests in the United States. CHARLES H. DICKEY,

"Box 773, Baltimore, Md."

A CORRESPONDENT informs us that the "annual meeting" of the Tennessee Gas and Coke Company was held in Knoxville—it is there that the named concern proposes to transact business when its works are built—Tenn., something over a fortnight ago. The officers chosen were: Directors, John M. Steele, Thomas J. Felder, Frank S. Hambleton, C. H. Harvey, Leon Fender, R. A. Scott and C. C. Howell; President, F. S. Hambleton; Vice-President, C. C. Howell; Secretary, C. H. Harvey; Treasurer, Leon Fender.

The proprietors of the Meriden Gas Light Company, of Meriden, Conn., have cut out quite some construction work for Superintendent Learned this summer. The main sections of the improvements are: A new purifying house, of the dimension of 47 feet 8 inches by 48 feet 8 inches, and two stories in height, to house four boxes, 16 feet square by 6 feet deep—the house is to be of brick, with stone trimmings, the roof to be of the steel truss order, covered with slate. A traveling crane traversing the building will be used for lifting the box covers, etc. The basement of the building will be used partly for a revivifying room. The purifiers will be installed by Messrs. R. D. Wood & Co., of Philadelphia. It is also proposed to construct a new meter house, 33 feet by 28 feet, in which is to be placed a station meter, up to passing 800,000 cubic feet per diem. This building will also cover the works office. Other improvements projected are new and ample scrubbing apparatus and a tar well. When these changes shall have been made the Com-

pany will be in position to supply any demand upon its manufacturing resources. The estimated cost of the betterments is put at $30,000.

AT the annual meeting of the Carlisle (Pa.) Gas and Water Company the officers elected were: Directors, John Hays, W. M. Henderson, Jr., R. M. Henderson, Lewis F. Lyne, John B. Landis and Frank C. Bosler; President, John Hays; Secretary and Treasurer, John B. Landis; Superintendent, Chas. Ramsey.

A CORRESPONDENT incloses the following clipping from the Grand Rapids (Mich.) *Press*, dated the 17th inst.: "As a result of the policy recently inaugurated by the Grand Rapids Gas Company about 70 of its employees will figure in the semi-annual dividend which will be paid to them on Saturday. At the last meeting of the Directors it was decided to allow to the employees of the Company a semi annual dividend of 6 per cent. of their earnings, provided the person receiving the same had been in the employ of the Company not less than one year prior to November 1, 1899. Out of the 160 employees nearly 50 per cent. will participate in the dividend, which amounts approximately to $1,200. The Company has adopted the method as an experiment, thinking that it will probably result in better satisfaction among the employees and in better service to itself. The majority of the men who will be benefited are office and plant employees, for out of 41 men employed on the streets by the Company only 5 have been in the service long enough to receive a share of the dividend."

AT the annual meeting of the Easton (Pa.) Gas Company the officers elected were: Directors, A. E. Childs, J. M. Porter, T. A. H. Hay, E. J. Fox, C. H. Hooke, G. F. Blake, J. W. Fox, A. E. Clarke and S. C. Smith; President, A. E. Childs; Vice-President and General Manager, A. E. Clarke; Secretary, J. W. Fox; Treasurer, C. H. Hooke. It was decided to extend the main system to Easton Heights, and it was also announced that a contract to carry the mains into the Phillipsburg (N. J.) territory of the Company's district had been made with the Delaware Bridge Company. The $1.40 net selling rate takes effect June 1st. The reports showed that the use of gas for cooking purposes was assuming large proportions. The Company sells ranges at cost and makes no charge for connecting them up.

WE are in receipt of a copy of the edition for the current year of the pamphlet gotten up by the Milwaukee (Wis.) Gas Light Company, the title of which is, "Facts Relating to the Use of Gas for Manufacturing Purposes." The title does not belie its contents, which are instructive and convincing. The pamphlet is creditable to its compiler (Mr. James H. Walker) and has been profitable, through the interest with which it was read by the residents of Milwaukee, to the Milwaukee Gas Light Company. The typography and printing of the pamphlet are up to the current magazine standard.

AT the annual meeting of the Bangor (Me.) Gas Light Company the officers elected were: Directors, T. U. Coe, A. C. Hamlin, L. H. Cutter, J. P. Bass and F. H. Small; President, A. C. Hamlin; Treasurer, George A. Crosby; Clerk, C. M. Griffin; Superintendent, C. E. Dole; Assistant Superintendent, V. K. Gould. Mr. T. U. Coe, former President of the Company, declined a re election.

MR. ROBERT R. SMITH, who, as Manager of the Greenwoods Company, New Hartford, Conn., had charge of that Company's gas plant, died at his home in New Hartford the morning of the 13th inst. Deceased was in his 58th year.

AT the annual meeting of the Gloucester City (N. J.) Gas Light Company the Directors chosen were: D. S. B. Chew, Jas. E. Hayes and H. B. Chew.

A MAJORITY of the Board of Gas and Electric Light Commissioners (Chairman Forrest E. Barker and Chas. H. Gifford) have declared that it is inexpedient to order a reduction in the rate charged for gas by the Lynn Gas Light Company. General Schaff, of the Commissioners, dissented from the opinion of his associates. He thought that a concession of 10 cents should be made, the same to date from October first next. The ruling rate at Lynn is $1 per 1,000, and that is low enough.

ABOUT a fortnight ago the office building of the St. Paul (Minn.) Gas and Electric Company was destroyed by fire. The Company is now in temporary offices at 342 and 344 Jackson street.

"MR. JOHN F. WOLF, in the service of the Penn Gas Coal Company since 1865 and its General Superintendent since 1885, died at his home in Greensburg, Pa., the evening of the 14th inst. He was in his 63d year. He was much respected by those who had dealings with him.—A. M."

THE *Electrical World*, in a note on "Electric Lighting in Japan," says that the first company in Japan to furnish electricity for lighting purposes was the Tokyo Electric Compauy, which was followed by companies in Kobe, Osaka, Kyoto and Yokohama. The Osaka Electric Company began supplying current for incandescent and arc lights in 1889, at the end of which year the company furnished electricity for 1681 incandescent and 11 arc lights. In 1894 the capital of the company was increased from 400,000 yen ($200,000), the original capitalization, to 800,000 yen ($400,000), and in that year 13,152 incandescent and 82 arc lamps were maintained. Two years later the capital was doubled, and during that year (1896) the company supplied current for 21,282 incandescent and 71 arc lights.

The paid up capital of the company is now 1,040,000 yen ($520,000), and on March 1, the company had contracts for supplying 31,364 incandescent and 144 arc lights. A charge of 1.70 yen (85 cents) a month is made for standard lights of 16-candle power to be used throughout the night, as against, for the same service, 3 yen ($1.50) in Tokyo, 2.50 yen ($1.25) in Yokohama, 1.95 yen (97½ cents) in Kobe and 1.20 yen (60 cents) in Kyoto, where water is utilized for power. The last dividends (per year) paid by the companies were as follows: Kyoto, 17 per cent.; Osaka, 16 per cent.; Kobe, 14 per cent., and Tokyo8 per cent.

THE *Sci. Am.* says that the great 25-ton crane which is mounted in one of the main dynamo rooms of the Paris Exposition presents many points of interest. It is of great height, being 20 meters from the ground to the highest point; it takes the form of an immense tower, formed of iron beams and braced by horizontal and oblique cross-pieces. It rolls upon a track laid along the whole length of the building, and is used to mount the large dynamos and engines of this section. The track is 6 meters wide, and is made up of two rails placed close together, leaving a space between the flanges, which is occupied by a series of short cross pieces which constitute a rack. With this the pinion of the crane engages, the transmission being made by a stout shaft which leads from a motor placed midway up the crane. The middle space underneath the tower is large enough to afford a wide passageway, and the railroad track which has been laid to bring in the pieces of the machines passes under it, leaving still a considerable space. The tower supports a platform at the top, whose height is 12½ meters from the ground. On this is a circular crown of rollers arranged to carry the horizontal beam of the crane, which may thus take a circular motion around a pin in the center. Upon the center of this beam, which is constructed of trelliswork, are placed the motors, which separate the carriage by chains which pass over a series of pulleys. The length of the horizontal beam is 25 meters and the carriage mounted upon it will describe a radius of 11 meters. It will lift 25 tons to a height of 12½ meters. The rate of lifting is 0.04 meters per second, and the carriage travels at 0.20 meters per second; the crane is moved as a whole at the same rate. It rolls upon eight wheels on each side. This crane has been constructed by Jules Leblanc, of Paris.

French Coal Production.

The production of coal, anthracite and lignite, in France for the year 1898, according to the official returns, amounted to 32,356,000 tons, showing an increase of 1,558,000 tons, or 5 per cent. over the preceding year. The production remained stationary for four years (1890–1893), but from 1894 it steadily increased. By reason of the rise in the price of coal the value of the fuel at the pit's mouth rose to $72,500,000 against $66,500,000 in 1897. Two-thirds of the amount of coal extracted was furnished by the important coal beds of the Departments of the Nord and Pas de Calais; 3,913,000 tons by that of the Loire; 2,431,000 tons by those of the Bourgogne and the Nivernais; 1,974,000 tons by the Gard; 1,781,000 tons by the Tarn and the Aveyron; 1,123,000 tons by the Bourbonnais, and 464,000 by the Auvergne. An increased activity reigned in all the regions, except in that of the Bourbonnais, where the coal bed is nearly exhausted. The increase in extraction necessarily brought about an increase in the number of miners. That number was 148,600, or an advance of 5,200 over the preceding year. The wages exceeded $35,000,000. France does not furnish the twentieth part of the coal production of the world, which amounted to 660,000,000 tons for the year 1898.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 32 Pine Street, New York.

The JOURNAL is the official organ of the
NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.
AMERICAN GAS LIGHT ASSOCIATION.
WESTERN GAS ASSOCIATION.
OHIO GAS LIGHT ASSOCIATION.
PACIFIC COAST GAS ASSOCIATION.

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SUBSCRIPTION—Three Dollars per annum, in advance. Single copies, 10 Cents.

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MONDAY, MAY 28, 1900.

An Improved Drilling Machine.

An improved drilling machine has been patented by Horatio A. Porter, of Holyoke, Mass. The machine may be adjusted to variable positions over the bed to suit the drill to the position of the work. The bed of the machine is provided with a series of supplemental tables upon which the work is placed, and the drill-operating mechanism is arranged centrally of the tables. The drill spindle may be adjusted: Horizontally to different positions with relation to the driving mechanism and by which the spindle may be driven in either of its adjusted positions without disturbing the connections with the driving shaft; at different angular positions and in vertical planes to the bed and to the shaft which drives the spindle, so that the drill may operate in various radial positions and at different angles to the work; and it may be moved endwise in the drill head without reference to the position of the latter to enable the drill bit to be moved toward the work or to be retracted therefrom, and with this drill spindle is combined means for adjusting the same endwise with very little friction between the spindle and the hand operated adjusting mechanism.

The Market for Gas Securities.

The event of the week in city gas circles was an agreement for virtually taking over the New Amsterdam Gas Company by the Consolidated Gas Company. The circular issued by the New Amsterdam Company to its shareholders says that the holders of its preferred and common stock can exchange the same for debentures of the Consolidated Gas Company, payable June 1st, 1910, and bearing interest at the rate of 6 per cent. per annum, on these terms: For every share of preferred (par value $100) $50 in debentures, and for every share of the common (par value $100) $26 in debentures. It is further stated that it is the intention to retire the debentures, as soon as arrangements can be made to that end, by exchanging them at par for the stock of the Consolidated Company at $190 per share, par value $100. The National City Bank is the depositary, and the time limit for receiving the shares is June 15th. There is no doubt that the transfers will be made in numbers sufficient to warrant the carrying out of the deal.

Meanwhile the gas rate remains unchanged, for at the meeting to-day (Friday) of the Consolidated Company's Trustees a quarterly dividend of 1 per cent. was declared, and no action respecting selling price was declared. The dividend is payable the 15th prox. The course of the trading in Consolidated for the week was quite erratic—the high figure was 196½, and the closing to-day was 192½ to 193. Holders not on the inside are mystified, and speculators are also at sea, but conservative men incline to the view that, with the taking over of the Standard Company, which event is now but a matter of a short time, those who have put their trust in the good faith of the Directors of the Consolidated Company will not have done so in vain.

Brooklyn Union discounted its recent advance; Peoples, of Chicago, is steady and strong; Consolidated, of Baltimore, is also on the improving list. The demand for gas bonds continues good.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MAY 28.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$54,595,200	100	192½	193
Central Union, Bonds, 5's.	3,000,000	1,000	103½	105
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	115	118
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	275	300
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	..
New Amsterdam Gas Co.	13,000,000	100	25½	26
Preferred	10,000,000	100	50¼	51
Bonds, 5's	11,000,000	1,000	103¾	104¼
Northern Union, Bonds, 5's.	1,250,000	1,000	95	97
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	109	111
" 1st Con. 5's	1,500,000	..	115	..
Richmond Co., S. I.	348,650	50	70	..
" Bonds	100,000	1,000	..	..
Standard	5,000,000	100	110	116
Preferred	5,000,000	100	130	140
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	114
Yonkers	299,65	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	163	164
" " Bonds (5's)	15 000,000	1,000	118	119
Bay State	50,000,000	50	1¼	1¼
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	35
" 1st Mtg. 5's	475,000	1,000	96½	99½
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	4¼	5
" " Bonds, 5's	5,250,000	1,000	64	67
Central, San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,207,000	1,000	106	107
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	60	65
Preferred	3,026,500	100	84	86
Consumers, Jersey City Bonds	600,000	1,000	102	105
Cincinnati G. & C. Co.	8,500,000	100	201½	202
Consumers, Toronto	1,700,000	50	230	235
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Consolidated, Baltimore	11,000,000	100	54½	55
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	19
" Con. Mtg. 5's	380,000	1,000	82	86
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co.	4,560,000	50	95¾	96
" Prior Lien 5's	4,598,000	1,000	99½	100
Detroit Gas Co., 5's	386,000	1,000	100	101
" Inc. 5's	16,000	100	100⅛	101
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	35	41
" Bonds	2,000,000	..	60	64
Grand Rapids Gas Lt. Co.	1,000,000	50	..	..
" 1st Mtg. 5's	1,125,000	1,000	..	..
Hartford	750,000	25	..	220
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	102	105
Indianapolis	2,000,000	..	101	103
" Bonds, 6's	2 650,000	..	100	104
Jackson Gas Co	250,000	50	72	78
" 1st Mtg. 5's	250,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	35	40
Bonds, 1st 5's	3,822,000	1,000	101½	103
Lafayette Gas Co., Ind.	1,000,000	100	40	45
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	106	
Laclede, St. Louis	7,500,000	100	68	70
Preferred	2,500,000	100	95	100
Bonds	10,000,000	1,000	110	110½
Madison Gas & Elec. Co.	400,000	100	75	80
" 1st Mtg. 6's	350,000	1,000	102½	108
Montreal, Canada	2,000,000	100	200	..
Newark, N. J., Con. Gas Co	6,000,000	..	..	55
Bonds, 6's	4,600,000	..	..	103
Essex and Hudson Gas Co.	6,500,000	..	35	40
New Haven	1,000,000	25	280	300
Nashville Gas Lt. Co.	1,000,000	50	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	99⅛	99¾
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	111⅜	111½x
2d "	2,500,000	1,000	104	105
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87⅛	90
San Francisco, Cal.	10,000,000	100	46¾	47
St. Paul Gas Light Co.	1,500,000	100	57⅛	58½
1st Mortgage 6's	650,000	1,000	82	85
Extension, 6's	600,000	1,000	..	..
General Mortgage, 5's	2,428,000	1,000	88	90⅛
St. Joseph Gas Co.	1,000,000	100	42	44
" 1st Mtg. 5's	750,000	1,000	96½	98
Syracuse, N. Y.	1,750,000	100	..	15
Bonds	1,612 000	1,000	88⅛	93
Washington, D. C	2,600,000	20	268¾	269½
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	100	95	98
Bonds, 5's	3,830,500	.	104	106
Wilmington, Del.	600,000		2 0	50

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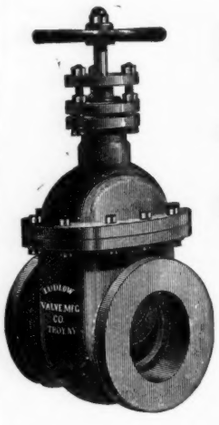

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The above Company have erected since 1893, or are now erecting, their universal type of Carbureted Water Gas Plants at the following Gas Works:

	Cubic Feet Daily.
Blackburn, England	1,250,000
Wind or Street Works, Birmingham, England	2,000,000
Saltley Works, Birmingham, England	2,000,000
Colchester, England	300,000
Birkenhead, England	2,250,000
Swindon (New Swindon Gas Company), England	120,000
Saltley Works, Birmingham, England (Second Contract)	2,000,000
Windsor Street Works, Birmingham England (Second Contract)	2,000,000
Halifax, England	1,000,000
Toronto	250,000
Ottawa	250,000
Toronto (Second Contract, Remodeled)	2,000,000
Lindsay (Remodeled)	125,000
Belleville	250,000
Ottawa (Second Contract)	250,000
Brantford (Remodeled)	200,000
St. Catherine's (Remodeled)	250,000
Kingston, Pa.	125,000
Montreal	500,000
Peterborough, Ont.	250,000
Wilkesbarre, Pa	750,000
St Catherine's (Second Contract)	250,000
Buffalo, N. Y.	2,000,000
Winnipeg, Man.	500,000
Colchester, England (Second Contract)	300,000
York, England	750,000
Rochester, England	500,000
Kingston, Ont.	300,000
Crystal Palace District, England	2,000,000
Duluth, Minn.	300,000
Catterham, England	150,000
Enschede, Holland	150,000
Leicester, England	2,000,000
Buenos Ayres (River Platte Co.)	700,000
Burnley, England	1,500,000
Kingston-on-Thames, England	1,750,000
Accrington, England	500,000
Tonbridge, England	300,000
Stretford, England	500,000
Oldbury, England	300,000
Saltley Works, Birmingham, England (Third Contract)	2,000,000
York, England (Second Contract)	750,000

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Closest Attention to Durability, Candle Power, Finished Appearance.

Samples to be Had for the Asking.

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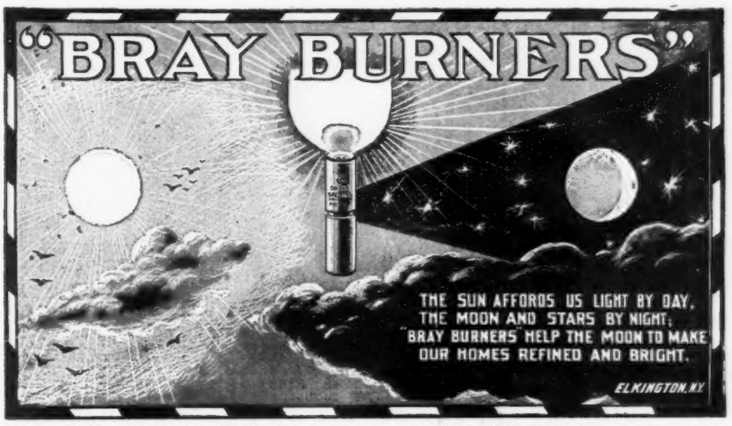
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THE SUN AFFORDS US LIGHT BY DAY,
THE MOON AND STARS BY NIGHT;
BRAY BURNERS HELP THE MOON TO MAKE
OUR HOMES REFINED AND BRIGHT.
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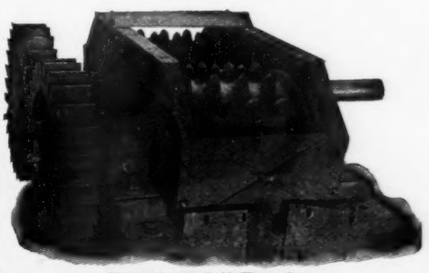
ENGINEERS, FOUNDERS, MACHINISTS,
Chicago, U. S. A.



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Tilting Coal and Coke Cars,
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Power Transmitting Machinery.

Machinery designed and erected to suit existing conditions and available space.

CATALOGUE UPON APPLICATION.

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Owners of the "SUTHERLAND" Patents for Water Gas Apparatus.

Gas, Electric Light, Water Works, and Electric Street Railways Built, Remodeled, Operated, Bought and Sold.

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Hollidaysburg, Pa.
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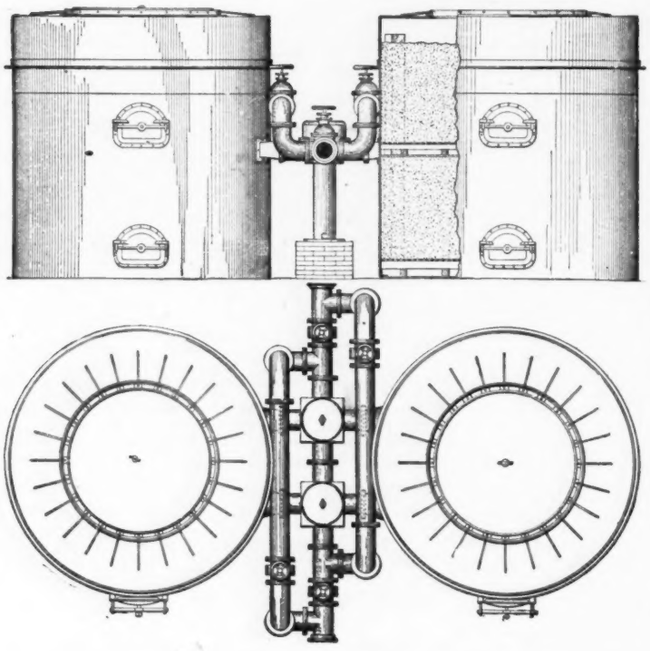
Lexington, Mo.
Mendota, Ill.
Circleville, O.
Joplin, Mo.
Ashville, N. C.
Youngstown, O.
Kingston & Rondout, N.Y.

CORRESPONDENCE SOLICITED.



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Covered by Five U.S. Patents.

In operation, revivification of the oxide is effected by repeated reversals of the direction of the flow of the gas through the beds (in the two boxes used under this system there are eight different routes for the gas to take) whereby the purified gas is made to revive the oxide in parts of the apparatus while the foul gas is fouling it in others.

The boxes are charged or discharged from the sides as well as the top.

There are no Hydraulic Cups or heavy covers.

Either end of the apparatus is inlet or outlet at pleasure.

The capacity is increased five-fold or more over ordinary methods without addition to building.

The apparatus costs less than for any other system.

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For the Year 1898.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the Thirtieth Year of Publication.
Compiled and Arranged by

JOHN W. FIELD,

Secretary and General Manager of The Gas Light and Coke Co., London.

Price $5. For Sale by

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Constructors of Coal Gas Apparatus.

EASTERN AGENTS FOR

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COAL GAS PLANTS AND GAS APPARATUS.

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Coal and Water Gas Plants.

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RECUPERATIVE FURNACES, WASHERS, CONDENSERS, PURIFIERS, PURIFYING MACHINES, COKE CONVEYERS, ETC.

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Gas Enriching Plants to Enrich Coal Gas up to 24 Candle Power, and Making a White, Bright, Non-smoking Gas.

GAS RETORTS AND SPECIAL BLOCKS AND FIREBRICK MANUFACTURED UNDER THE SUPERINTENDENCE OF MY OWN CHEMIST.

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LATEST IMPROVED GAS EXHAUSTER

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NEW GAS GOVERNOR AND STEAM VALVE.

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The Most Perfect Gas Governor on the Market.

MORE DIRECT IN ACTION. FEWER PARTS.
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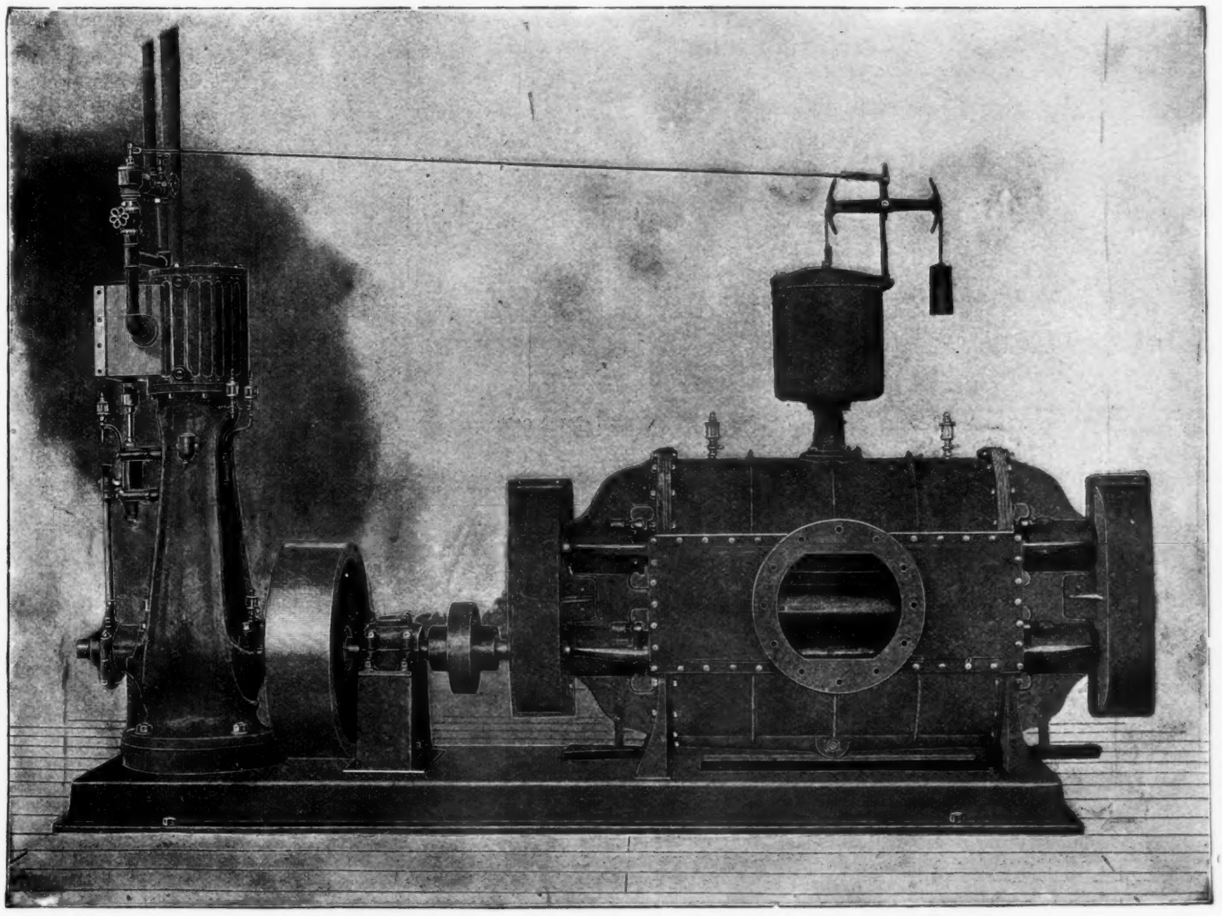

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No. 36.

Controls and Operates the

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Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in seventy-five Cities and Towns.

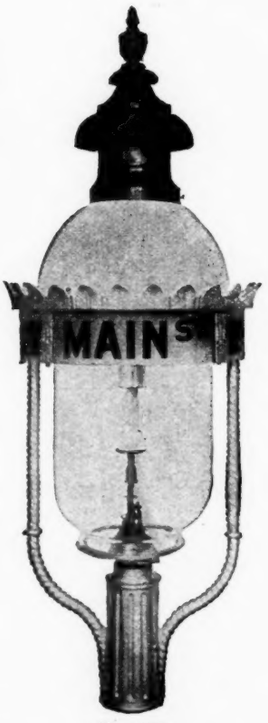
By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.



No. 38.

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This Edition of the "Handbook for Gas Engineers and Managers" is a great improvement on all previous editions Much of the text has been re-written, in order to keep the work abreast of the constant advances that are being made in the Gas Industry.

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With Instructions for Care and Working of the Same.

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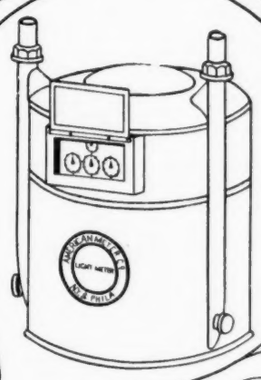

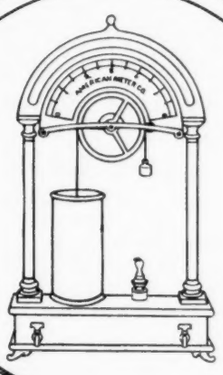

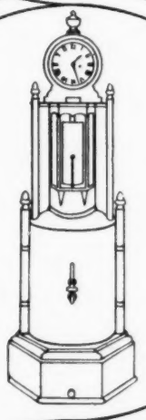

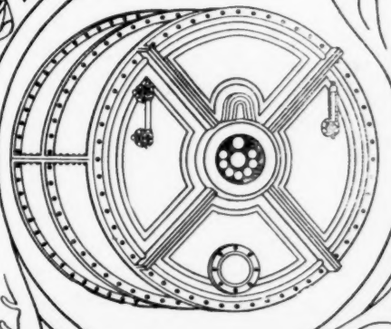

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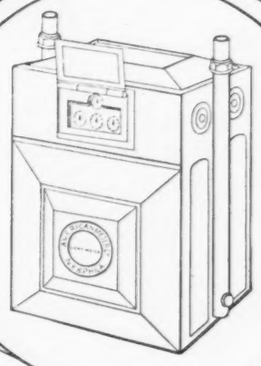

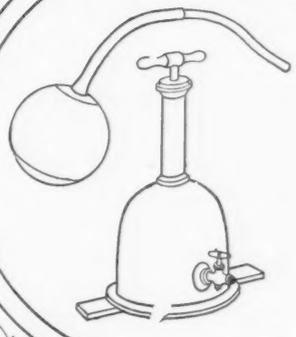

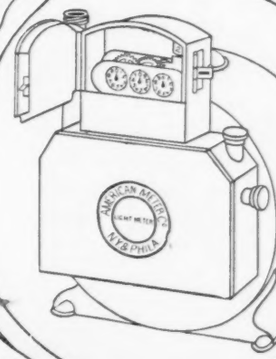

PUBLIC LIGHTING TABLE.

JUNE, 1900.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Fri.	1	7.50 PM	3.30 AM	7.15	3.15
Sat.	2	10.10	3.30	7.15	3.15
Sun.	3	10.40	3.30	7.15	3.15
Mon.	4	11.00 FQ	3.30	7.25	3.15
Tue.	5	11.30	3.30	7.25	3.15
Wed.	6	11.50	3.30	7.25	3.15
Thu.	7	12.20 AM	3.30	7.25	3.15
Fri.	8	12.50	3.30	7.25	3.15
Sat.	9	1.30	3.30	7.25	3.15
Sun.	10	2.10	3.30	7.25	3.15
Mon.	11	No L.	No L.	7.25	3.15
Tue.	12	No L. FM	No L.	7.25	3.15
Wed.	13	No L.	No L.	7.25	3.15
Thu.	14	8.00 PM	9.50 PM	7.25	3.15
Fri.	15	8.00	10.30	7.25	3.15
Sat.	16	8.00	11.10	7.25	3.15
Sun.	17	8.00	11.40	7.25	3.15
Mon.	18	8.00	12.10 AM	7.30	3.15
Tue.	19	8.00 LQ	12.50	7.30	3.15
Wed.	20	8.00	1.20	7.30	3.15
Thu.	21	8.00	1.50	7.30	3.15
Fri.	22	8.00	2.30	7.30	3.15
Sat.	23	8.00	3.30	7.30	3.15
Sun.	24	8.00	3.30	7.30	3.15
Mon.	25	8.00	3.30	7.30	3.15
Tue.	26	8.00 NM	3.30	7.30	3.15
Wed.	27	8.00	3.30	7.30	3.15
Thu.	28	8.00	3.30	7.30	3.15
Fri.	29	8.00	3.30	7.30	3.15
Sat.	30	8.00	3.30	7.30	3.15

TOTAL HOURS LIGHTING DURING 1900.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	230.50	January	423.20
February	175.40	February	355.25
March	189.00	March	355.35
April	160.30	April	298.50
May	150.40	May	264.50
June	137.00	June	234.25
July	152.00	July	243.45
August	171.50	August	280.25
September	187.20	September	321.15
October	213.10	October	374.30
November	221.50	November	401.40
December	231.50	December	433.45
Total, yr.	2221.40	Total, yr.	3987.45

PHILADELPHIA, May 1st, 1900.

To the Stockholders of Welsbach Light Company and Welsbach Commercial Company:

The undersigned have been requested, by large holders of shares of stock of the Welsbach Commercial Company and of the Welsbach Light Company, to act in the capacity of a committee, to consider the changes which have taken place in the character of the Welsbach business since its separation into the manufacturing and the commercial companies, and to suggest and recommend a plan by which a closer concentration of management and greater economies in production and distribution of goods can be effected than is possible under the present organization in the changed condition of the trade. A few comparisons illustrate these differences in conditions, viz.:

The light was formerly sold by exclusive agents, as a specialty, at $2.50; to-day a better article is sold at $1 over the counter as staple goods. Formerly but a single product was made and sold; to-day a great variety of goods is demanded by the trade, making imperative most intimate relations between the manufacturing and selling departments. Formerly there were large margins; to-day profits can only be derived from a great volume of sales and very low cost of manufacture. The matter of taxes, formerly of no great moment, has to-day become a large and very serious question.

These illustrations and others convinced the committee that the entire business could be conducted at the most profit and with the least cost by one organization, and therefore they beg to submit and recommend that the following plan in substance be adopted and carried into effect, viz.:

1. That a new company be organized with an authorized capital stock of $3,500,000 and an authorized issue of $7,000,000 of 30-year sinking fund 5 per cent. gold bonds, subject to call at par and accrued interest for sinking fund purposes, secured by mortgage upon all its property, including stocks acquired under this plan of reorganization, with a sinking fund provision of $105,360 per annum.

2. That said new company buy the shares of the Welsbach Light Company not owned by Welsbach Commercial Company, and the common and preferred shares of Welsbach Commercial Company, and pay therefor as follows, viz.:

For each share of Welsbach Light Company, $60 at par in said bonds.
For each preferred share of Welsbach Commercial Company, $100 at par in said bonds.
For each common share of Welsbach Commercial Company, $100 at par in the stock of the new company.

That the balance of the bonds not required to carry out the above plan, amounting to $409,000 at par, should be certified and delivered only as required hereafter, under proper restrictions to be contained in the mortgage, for the conduct or extension of its business, the construction, enlargement, alteration and betterment of works, the acquisition of property, real or personal, or for working capital.

The above plan is simple and effective, being merely a contract of purchase and sale between the new corporation and holders of shares in the other two companies, and has been accepted as satisfactory by a large number of shareholders.

The new corporation has, therefore, been organized under the laws of the State of New Jersey, under the name of "Welsbach Company," and has entered into a contract with The Provident Life and Trust Company, of Philadelphia, dated May 1st, 1900, providing in detail for carrying the above plan into effect if accepted by the holders of at least 90 per cent. of the shares of the Welsbach Light Company other than the shares owned by the Welsbach Commercial Company and 90 per cent. of the common shares and 90 per cent. of the preferred shares of the Welsbach Commercial Company, and reserving to the Committee and to the Welsbach Company the option to carry out the plan, although accepted by a less number of shares: *Provided*, That should the Welsbach Commercial Company dispose of any of its present holdings in the Welsbach Light Company prior to the consummation of the plan the Welsbach Company shall be at liberty to withdraw.

Copies of the contract referred to are on file at the office of the depositary, and at the office of Emerson McMillin & Co., 40 Wall Street, New York, subject to inspection by shareholders at reasonable business hours.

All shareholders desiring to avail themselves of this offer of the Welsbach Company are required to deliver their shares to The Provident Life and Trust Company, of Philadelphia, 401 Chestnut Street, Philadelphia, for the account of and assigned to the Welsbach Company, on or before the 1st day of June, 1900. Upon delivery of shares vendors will receive the negotiable receipt of The Provident Life and Trust Company, of Philadelphia, to hold pending the completion of the detail of the plan and of the issue of the shares and bonds of the Welsbach Company. For the convenience of shareholders, Emerson McMillin & Co., of 40 Wall Street, New York, will receive shares in New York City, forward the same to The Provident Life and Trust Company, of Philadelphia, and deliver to such depositors the negotiable receipts to which they will be entitled when obtained from the depositary.

JOHN C. BULLITT,
THOMAS DOLAN,
HENRY SELIGMAN,
SAMUEL R. SHIPLEY,
EMERSON McMILLIN,
GEORGE PHILLER,
} *Committee.*

THE UNITED GAS IMPROVEMENT COMPANY.

THE STANDARD JUNIOR,

THE STANDARD DOUBLE SUPERHEATER,

LOWE WATER GAS APPARATUS.

Total Sets Installed to January 1, 1900, - - - - - - - - 327

Total Daily Capacity - - - - - - - - - 207,425,000 Cu. Ft.

WATER GAS PLANT AS AUXILIARY TO COAL GAS WORKS.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY Prest. DAVID R. DALY V. Prest. & Treas.
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CLAY GAS RETORTS, FIRE CLAY TILES,
FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

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MANUFACTURERS OF

CLAY RETORTS, FIRE BRICK,
Gas House and other Tile.

Office, 88 Van Dyke St. Brooklyn, N. Y.

Established 1854. Incorporated 1869.

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Water Gas Cupola Linings, Fire Clay, Etc.

Proprietors for the U. S., Coze System of Inclined Benches.

Estimates Furnished on Application for Most Successful Style of Construction.

Also for Free-Firing and Full and Half-Depth Regenerative Benches, for Burning either Coal or Coke in the Furnaces.

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The Construction of Gas Works

PRACTICALLY DESCRIBED,

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Manhattan Fire Brick and Enameled Clay Retort Works.

Works, Weber, N. J.

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Modern Recuperative Furnaces

And Standard Fire Brick and Gas Retorts.

Works, LOCKPORT STATION, PA.

—ESTABLISHED 1864.—

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EXCELSIOR FIRE BRICK & CLAY

RETORT WORKS

WORKS, Perth Amboy, N. J.

OFFICE, 418 to 422 East 23d St., N. Y.

Clay Gas Retorts,

BENCH SETTINGS,

Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. Galesburg or Brooklyn.

In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
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C. L. GEROULD, Galesburg, Ills.

Eastern Agent, GEO. P. WARRINER, 675 Bedford Ave., BROOKLYN, N. Y.

Parker-Russell Mining and Mfg. Co.,

CITY OFFICE,
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Our immense establishment is now employed almost entirely in the manufacture of

Materials for Gas Companies

We have studied and perfected three important points. Our retorts are made to stand changes of temperature, the strongest heats of the furnace, and the abrasion of feeding and emptying. We construct

Half and Full Depth Benches of Our Own Design,

Containing 6, 8 or 9 Retorts.

We have Greatly Improved our Recuperators. Coal or Coke can be used as Fuel in Furnaces.

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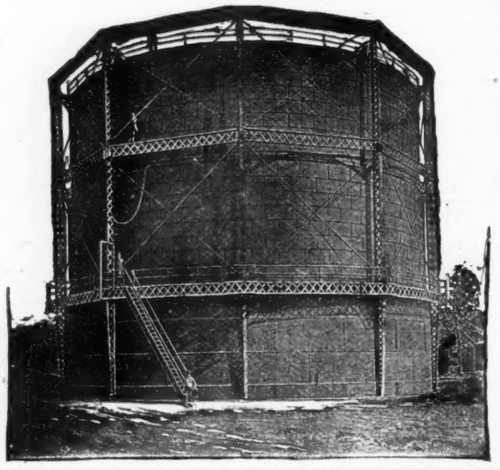

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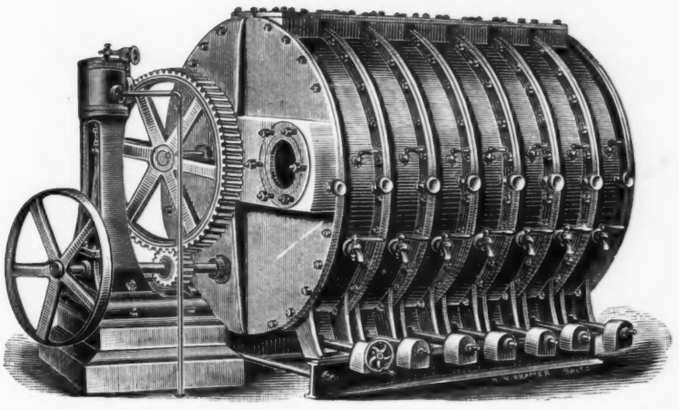

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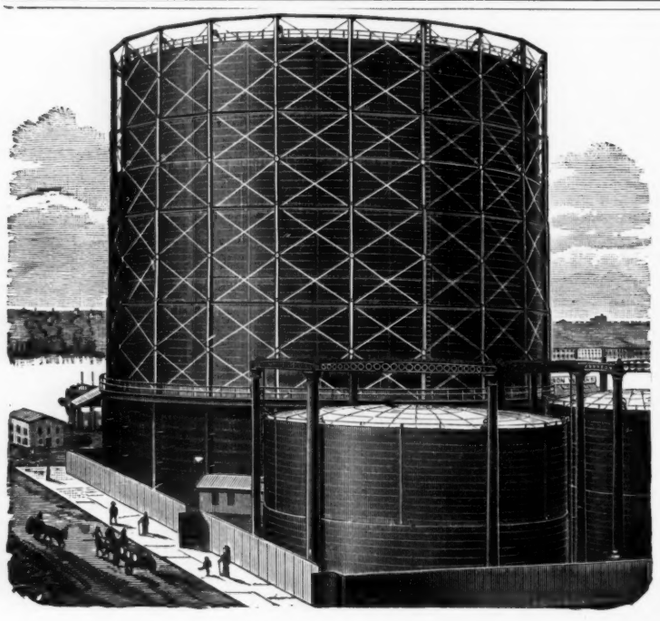

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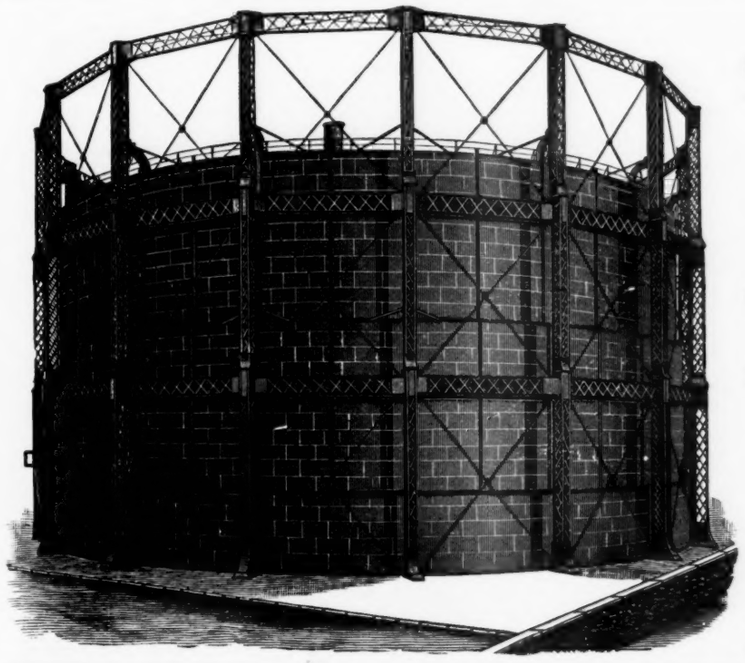

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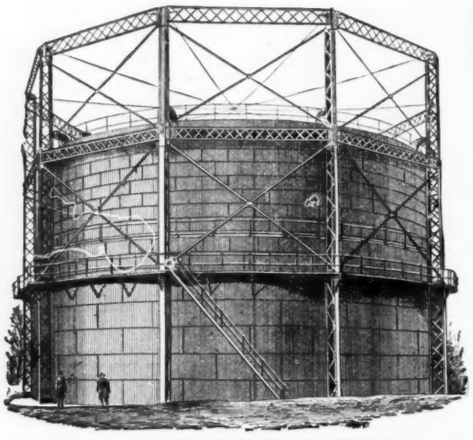

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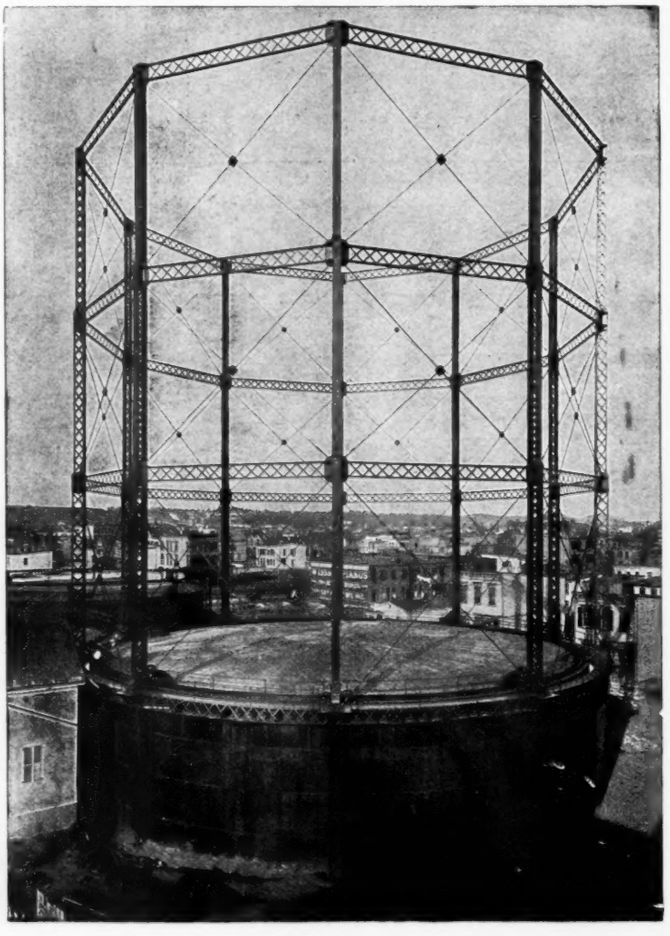

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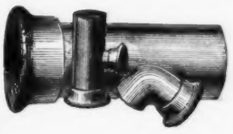

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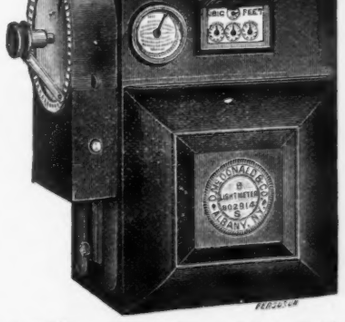

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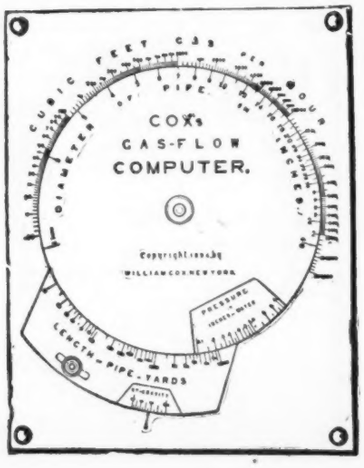

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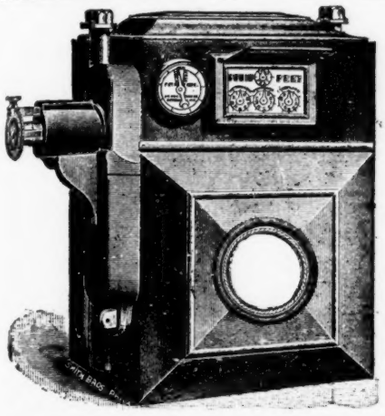

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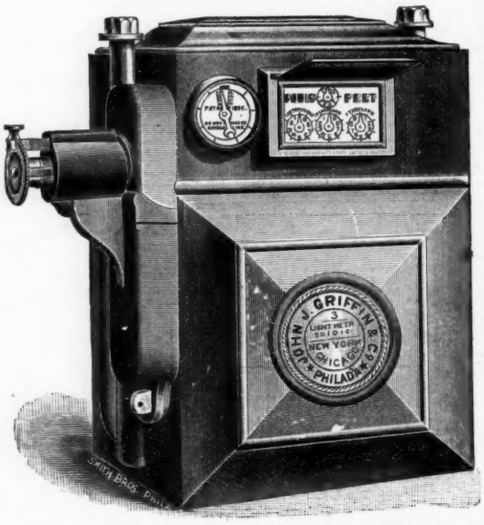

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